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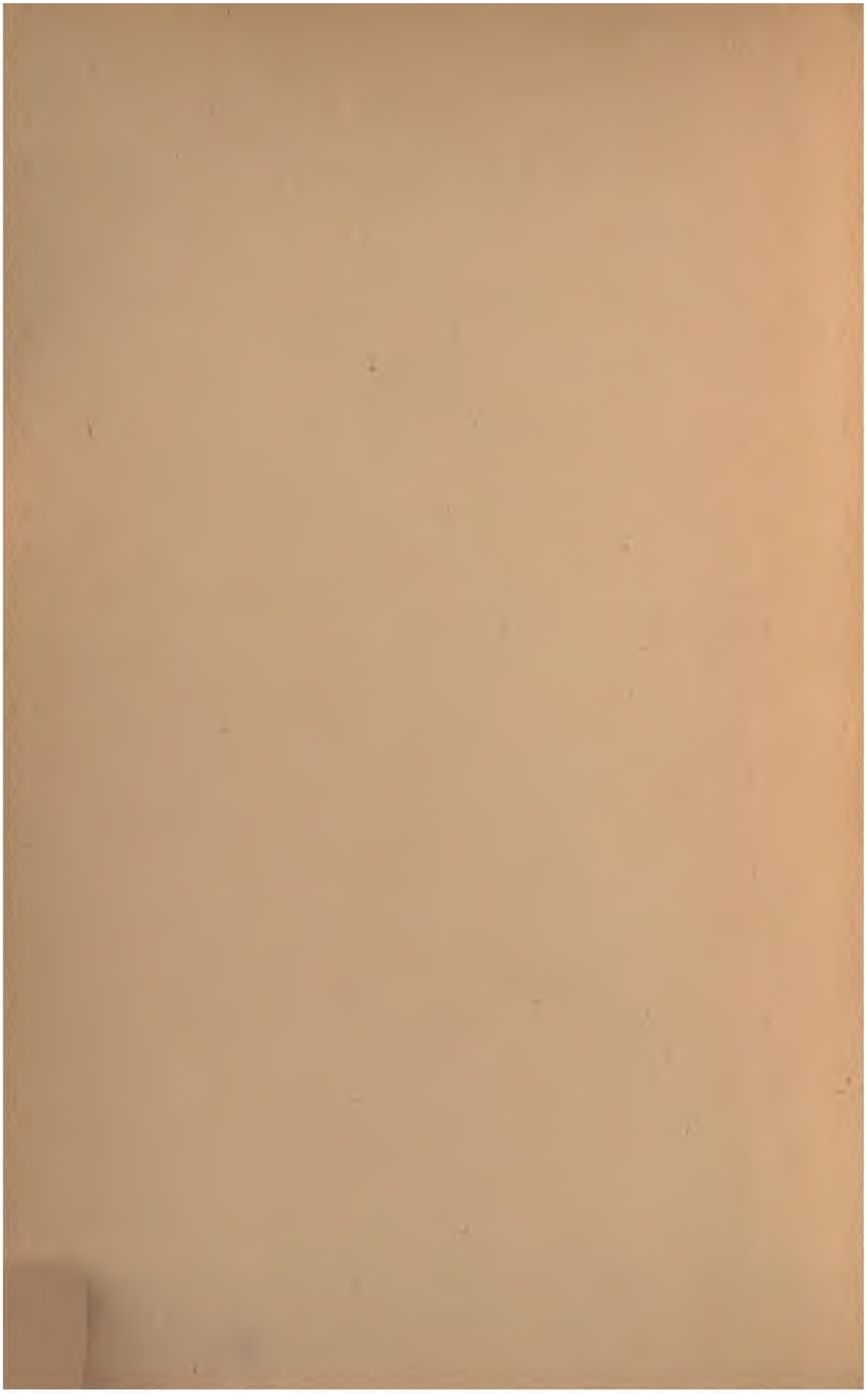

MEDICAL GYNECOLOGY

BY

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Third Edition, Thoroughly Revised

WITH ORIGINAL ILLUSTRATIONS

PHILADELPHIA AND LONDON

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PROFESSOR OF DISEASES OF WOMEN, N. Y. POST-GRADUATE MEDICAL SCHOOL AND HOSPITAL

IN ADMIRATION OF HIS SURGICAL ATTAINMENTS
AND AS A TOKEN OF MY SINCERE
REGARD AND ESTEEM

42944

PREFACE TO THE THIRD EDITION

THE demand for a new edition of this work coincides, in point of time, with a more general recognition in every department of medicine of the importance of the internal secretions. We have contended, in previous editions of this work, that in the realm of Gynecology the rôle of the internal secretions is an important one. In recent works, especially in Germany, and in the admirable work by Cushing on the Pituitary Body, we have the very highest proofs of the close interrelations existing between the genital tract of women and the various internal glands. Therefore much has been added in these pages on the relation of the various glands producing internal secretions to pathologic and normal states in women. No more fitting place for the discussion of these questions can be found than in a work dealing with Medical Gynecology. The writings of Kermauner, Josef Novak, Cushing, Biedel, and others have been drawn upon to bring these sections dealing with the internal secretions thoroughly up to date. Much in these writings will be found to support and elaborate many of the views and opinions expressed by the author in the former editions of this work. This field is one which is of great interest to all medical men, and it is a pleasure to observe that at last gynecologists too are awakening to a sense of its importance in their particular sphere of endeavor.

S. W. BANDLER.

NEW YORK CITY.

PREFACE TO THE FIRST EDITION

THIS book has been written as a result of frequent inquiries for a work dealing with the non-operative side of gynecology. It represents, with elaborations, a grouping and rearrangement of my clinical lectures. The various topics have been viewed from the standpoints of the symptoms, the disease, the bimanual and microscopic findings, and the general physical and nervous state.

The knowledge gained by studying the diseases of women from these different points of view gives a more distinct mental picture and furnishes logical coördinated conclusions. The resulting repetition and reiteration emphasize important points and make each section fairly complete in itself, thus diminishing as much as possible the necessity of referring to other sections, except for more complete elucidation.

Operative procedures have been viewed as a last resort in those numerous conditions where medical means can accomplish so much. In no field of medicine is conservative treatment of greater value, but, combined with this, there is needed a knowledge of the relation of normal and pathologic genital functions to the general physical and psychic health of woman. I have endeavored to show the relation which pelvic abnormalities really bear to the physical and mental state of the female, in order that we may deal intelligently with gynecologic diseases and not confine our diagnosis and therapeutic methods to the pelvis.

The life and make-up of woman are such that, aside from the diseases and injuries to which she is liable, physiologic processes, heredity, predisposition, mental perturbation, the emotions, marital relations, etc., have an important bearing, and, therefore, the physician who enters into a study of these factors becomes a far better judge of the meaning of symptoms.

I have consulted particularly the writings of Kisch (puberty), Joseph (syphilis and gonorrhea), Bumm, Wertheim and Finger (gonorrhea), Oskar Frankl (electricity and hydrotherapy). To the teachings and writings of Winter must be credited much of the advance in matters relating to diagnosis and to carcinoma. I gladly record my especial obligation to him for much that has aided me these past twelve years and, consequently, for much that appears in these pages.

The chapter on Constipation, written by my friend, Dr. Geo. Mannheimer, is in complete harmony with the views expressed in other sections, and the value of its teachings must be self-evident. I am indebted to Prof. H. T. Brooks, of the Post-Graduate Medical School, for valuable opinions and information which were given to me while writing the section on Gonorrhea. Dr. I. Strauss revised the pages on bacteriologic methods. I am indebted to Dr. I. Strauss and to Dr. S. Philip Goodhart for suggestions in the section on Associated Nervous Conditions. Dr. Leopold Jaches, of the department of photography, Cornell Medical School, has been of invaluable aid to me in photographing instruments, apparatus and therapeutic procedures on the patient. Mr. K. K. Bosse has made the drawings and illustrations in his well-known accurate and artistic manner. I wish to express my thanks to the publishers, and particularly to the vice-president, Mr. R. W. Greene, for hearty support and assistance in the many details connected with the publication of this book.

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MEDICAL GYNECOLOGY

GYNECOLOGIC EXAMINATION

HISTORY TAKING

A certain definite order should be followed in taking a gynecologic history, to obtain information concerning the patient's physical condition, but more particularly to learn of those important factors which play their rôle in the pelvis and those general states which are so profoundly influenced by normal or pathologic pelvic processes. The points which are to be held especially in mind in taking a gynecologic history are the cardinal symptoms which bring women to the physician for their special care—amenorrhea, dysmenorrhea, menorrhagia, metrorrhagia, leukorrhea, pruritus vulvæ, pelvic pain and backache, sterility, dysuria or frequent micturition, nervous annoyances.

Age.

If *married*, how long?

If *parous*, how many children; when; the last child; number living; cause of death?

Pregnancies—nausea; vomiting; effect on health; pain during pregnancy?

Labors—duration; instrumental; how long in bed; temperature?

Nursing—how long; duration of amenorrhea, of lactation; influence of nursing on general health?

Abortion—Miscarriage—how many; when; in what months; date of last one; curetted?

Diseases of Childhood—diphtheria; scarlatina; chorea, etc.?

Other diseases—typhoid; chlorosis, etc.?

Establishment of menstruation—when; regular; longest interval; pain before, during, or after; fluid blood or small clots or pieces; amount; duration?

Pain, from the very first menstruation or developing after months or years?

Nervous conditions before or on establishment of menstruation or before each menstruation?

Pre-menstrual symptoms; headache; fullness in pelvis; backache; fullness of breasts; palpitation; restlessness?

Marriage—dysmenorrhea better or worse; acquired; alteration in character of menstruation; leukorrhea or irritation of bladder shortly after marriage; dyspareunia?

Menstruation now—how often; duration; amount; pain before, during, or after; in bed during menstruation; date of last menstruation; duration of amenorrhea if acknowledged; is pregnancy probable?

Pre-menstrual symptoms—begin how long before menstruation; headache; neuralgia; nausea; flushes; palpitation; nervousness, restlessness; backache?

Pre-menstrual and menstrual pelvic pain—abdominal; in ovarian region; in uterine area; bladder; back; coccyx; radiating to hips; down thighs; up to the ribs; how long since noted; related to labor or abortion?

Intermenstrual pain—abdominal; ovarian region; bladder; back; coccyx; worse during menstruation; sense of bearing down or looseness of pelvic organs?

Was there ever an acute onset of pain which confined patient to bed; associated with temperature; loss of blood; duration of attack; diagnosis made at that time?

Urination—frequent; how often; at night; painful; duration of annoyance; ever acute; shortly after marriage; after labor; after abortion; pain in kidney region; pain before, during, or after urination?

Leukorrhea—duration; white; yellow; thin; mucoid; odor; associated with burning or urinary annoyance at onset; date of beginning; better; worse?

Pruritus vulvæ—duration; leukorrhea; alterations in skin; thirst; amount of urine passed; weight lost?

Nervous symptoms—languid; tired; mental weariness; depressed; excitable; irritable; cross; cry easily; palpitation; phobias; sleepless, because of pain or flow of thought or worry; mental shocks?

If menopause—how long; came on slowly or suddenly; bleedings increased before ceasing finally; flushes; how often; at night; nervous; sleepless; depressed; excitable; irregular spotting; leukorrhea; disagreeable discharge?

Headache; cough; palpitation; appetite; digestion; character of food; constipation; hemorrhoids; drugs or enemata for constipation?

Family history with especial reference to tuberculosis, diabetes, and carcinoma?

Gain or loss in weight; increase in size of abdomen?

Careful questions concerning symptoms of syphilis if indicated.

Operations; previous treatments?

Finally—let the patient in a few words define and explain the annoyances and symptoms of which she complains and because of which she comes.

Preliminary to the abdominal and pelvic examination, the condition of the lungs, the heart, and the state of the blood should be determined.

EXAMINATION OF THE ABDOMEN

For the gynecologic examination the patient should remove her corset, and should loosen all the bands about the waist. Examination is performed with the patient in the lithotomy position with the knees separated by movable rests, in order to remove any strain upon the abdominal muscles. The bladder should be emptied into a commode, unless it is desired to first determine the condition of the urethra, in which event the urine is obtained with the aid of the catheter. Unless the rectum and sigmoid are empty a thorough examination cannot be made.

The abdomen should be thoroughly examined and percussed and the condition of the abdominal wall, whether elastic or flaccid, should be noted, and the presence of separation of the recti muscles or the existence of a hernia should be looked for. Painful spots should be noted, particularly in examining the region of the gall-bladder and appendix and the points of Morris (see Head Zones, p. 47). If a line be drawn from the umbilicus to either anterior superior spine of the ilium, a point on each of these lines 1½ inches distant from the umbilicus corresponds to Morris's points. If the appendix alone is involved, the right point will be sensitive and the left point will not, while, if there is pelvic inflammation or marked involvement, both points will be sensitive. The presence or existence of movable or floating kidney on either side should be carefully looked into and the abdomen should be percussed to determine the existence of splanchnoptosis. The abdomen should be thoroughly palpated to determine the existence of a pelvic tumor or of a uterus enlarged by a tumor or by pregnancy, or to determine the presence of the uterus held close to the abdominal wall by a retro-uterine tumor or exudate. The fingers of either hand should press down into the pelvis to determine the existence of abdominal rigidity or to note the production of pain. After the conclusion

of the subsequent examination the patient, while in a seated or standing position, should be further examined as to the existence of movable or floating kidneys and to note the outline of the abdomen, especially if gastro-enteroptosis or very loose abdominal walls are present.

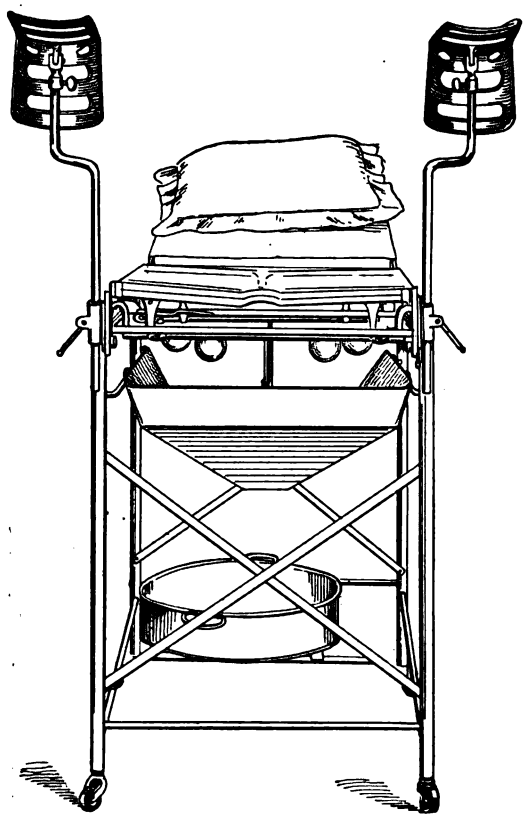

Fig. 1.—Examining table with adjustable movable leg-holders. Underneath is a wide trough which is pulled out during vaginal or bladder therapy and which carries fluids and cotton down to the basin below. A large leather cushion makes the lithotomy position exceedingly comfortable. The upper wing of the table can be raised to any angle. The lower end can be raised, with the patient on it, to a mild Trendelenburg position.

I find the table illustrated in Fig. 1 of the greatest convenience. With it the patient can be readily elevated into modified degrees of the Trendelenburg position. The legs are supported by movable rests which swing the knees into a comfortable position. Below the surface of the table is a large trough, nearly the full width of the table, which may be drawn out, and which readily catches the fluids poured out from a speculum or from the catheter when irrigating the bladder. The fluid runs down this wide trough into a large round basin placed upon a framework underneath the table.

INSPECTION AND PALPATION

Vulva and Vagina.—The external appearance of the vulva should be noted and the condition of the skin and the hair-follicles as well as the skin of the thigh area can be observed. The large and small labia are then separated and the color of the vulva and

Fig. 2.—Separation of the labia with the thumb and index-finger is an essential step to clearly disclose the important structures of the vulva, and the urethra preliminary to bimanual examination. Careful examination of the vulva and its contained ducts, glands, and openings is of prime importance.

the character of the mucosa are observed (Fig. 2). The external opening of the urethra is carefully looked at, the vestibule likewise, and redness or accumulations in the peri-urethral ducts are looked for. In nulliparæ the fourchet is examined, and if these is an accumulation of discharge, it is wiped away by moist

cotton sponges, so that the character of this part of the vulva is distinctly visible. The condition of the perineum is observed and the patient is told to press down as if at stool, in order to determine any protrusion of the anterior or posterior vaginal walls. The opening of the ducts of Bartholin are next examined and flea-bite redness of their outer ends looked for. Pressure is then made on the glands of Bartholin and a smear taken of the secretion. Skene's glands are then brought into view, if possible, by separating the lips of the external opening of the urethra, and if a discharge is present a smear is taken. The urethra is then massaged and a smear is taken of the secretion. If no secretion is obtained, and if symptoms point to possible involvement of the urethra, a platinum loop or, better still, a small platinum flat spoon sterilized over the flame, gently introduced, scrapes the urethral walls from behind forward (Fig. 3).

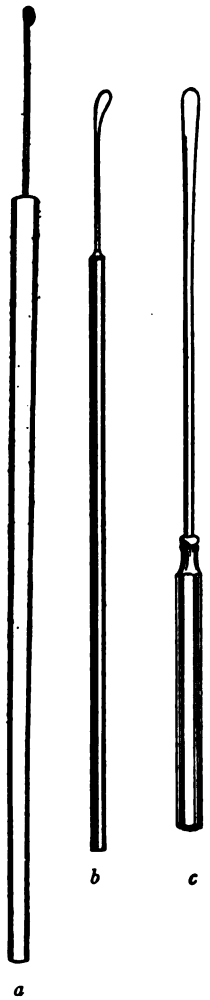

Fig. 3.—*a*, Platinum loop for taking secretion from the urethra, vulvar glands, ducts of Bartholin, vagina, cervix. *b*, Platinum spoon for taking scrapings from the urethra, vulva, vagina, and cervix. *c*, Small spatula for the same purpose.

After washing the vulva a loop or platinum spoon takes a smear of the vaginal secretion. The external opening of the urethra is then washed with antiseptic solution and the urine is drawn off into a sterile glass for examination for albumin, sugar, and for urea determination, microscopic examination of the sediment, and for the possible making of bacterial cultures or guinea-pig inoculations.

The first and second fingers of either hand, preferably the left hand, are dipped in soapsuds and introduced into the vagina. They should first note the condition of the levator ani muscles, their elasticity; the fingers should

pass down along their lateral border toward the perineum and the degree of their firmness or laceration or flaccidity should be noted. The fingers are then introduced along the vagina, and the heat, smoothness, roughness, and sensitiveness of the vaginal mucosa should be determined. The fingers are then introduced into the fornices and the existence of bands or of scars running out from the lateral borders of the cervix should be looked for.

The cervix is then palpated and the presence or absence of lacerations should be remarked. The size of the cervix and the consistence of the cervix should then be noted, and the character of the external os should be determined—normal, soft, smooth and velvety, rough or granular, small or large external os; and if large, whether it admits a finger.

Uterus.—The position and size of the uterus should then be determined. The index and middle fingers are in the vagina, the thumb is over the clitoris, the two last fingers of the hand are folded upon the palm and make pressure on the perineum (Fig. 4). The elbow of the examining hand rests against the body or on the knee, which is flexed, the foot resting on a stool. The body is inclined forward and pushes the examining hand high up and presses the closed last two fingers against the perineum without any conscious exertion of the arm. The two internal fingers are then turned with their palmar surface upward to determine whether the fundus is in normal anteflexion, or in anteversion, or in pathologic anteflexion. Ofttimes the fundus can be readily felt, especially if the bladder has been emptied.

The external hand presses with the palmar surface of the fingers upon the abdomen between the umbilicus and the symphysis. If the uterus is in anteflexion, it will be felt between the external and internal fingers, or else the pressure of the external hand will be distinctly felt by the internal fingers communicated by the body of the uterus (Fig. 5). The character of the anterior uterine wall should then be determined. The posterior wall of the uterus should be palpated by the external hand and its size, consistence, breadth, and thickness can be determined. The internal fingers are then passed first into one lateral fornix and then into the other. It is often valuable to use the fingers of the left hand in palpating the patient's left adnexa and the fingers of the right hand in pal-

pating the right adnexa. The fingers are introduced into the lateral fornix and the external hand passes out from the fundus and then a little upward, pressing gently and firmly against the

Fig. 4.—Correct position of patient and physician in making bimanual examination. Resting the examining arm on the leg of the same side enables the body, by leaning forward, to push the examining fingers steadily and deeply into the vagina without conscious effort. The index and middle fingers are always introduced into the vagina when possible.

abdominal walls in an effort to bring the tube and ovary between the fingers of the two hands. A normal tube can be felt with difficulty; normal ovaries, except in very obese women or women with resistant abdominal walls, can be readily palpated and their

size and sensitiveness determined. In some cases, even with normally anteflexed uteri, the tubes and ovaries are descended or prolapsed postero-lateral to the uterus or even into the lateral area of the cul-de-sac of Douglas.

If the uterus is not felt in anteflexion, the internal fingers are introduced into the posterior fornix to determine the existence of a retroflexion (Fig. 6). The fingers then feel, in the cul-de-sac of Douglas, the fundus of the uterus, and its continuity with the

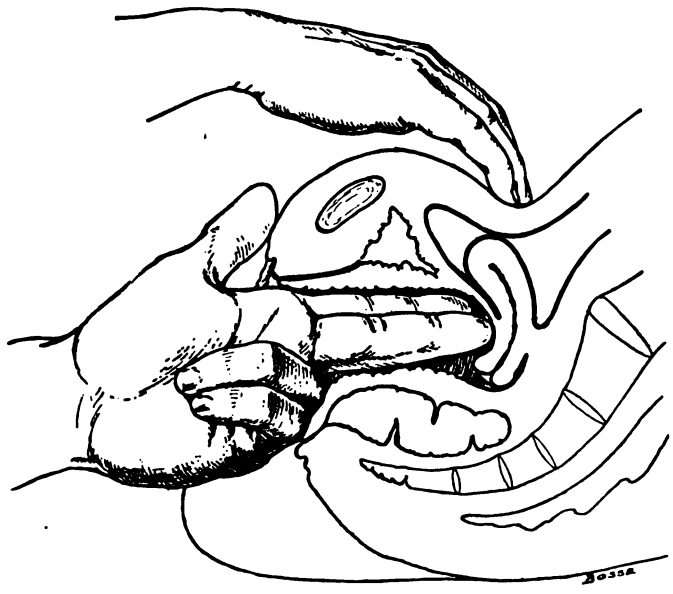

Fig. 5.—Position of the examining fingers in the vagina and the finding of the fundus uteri between the internal and external fingers when the uterus is normally flexed and the bladder is empty.

cervix is determined. The adnexa of such a uterus are felt by introducing the examining fingers high up into the posterior fornix, and then palpating laterally toward the lateral pelvic wall. The external hand is relatively of little use in this manipulation, but pressure should be exerted in the lower part of the hypogastric region in order to press the ovaries nearer to the internal fingers. By deep pressure adnexa situated laterally, even if adherent, can be brought between the external and internal fingers, but many of such adherent tubes and ovaries cannot be

palpated if they are adherent to the posterior wall of the broad ligament or to the lateral pelvic wall, or if, as so often happens, they are adherent to and covered by the sigmoid and other peritoneal adhesions. In some cases elevation of the patient into the Trendelenburg position enables such adnexa to be palpated.

If the uterus is not found in anteflexion or retroflexion, it should be sought in retroversion with the fundus in the hollow of the sacrum or higher up. This means that the internal fingers must

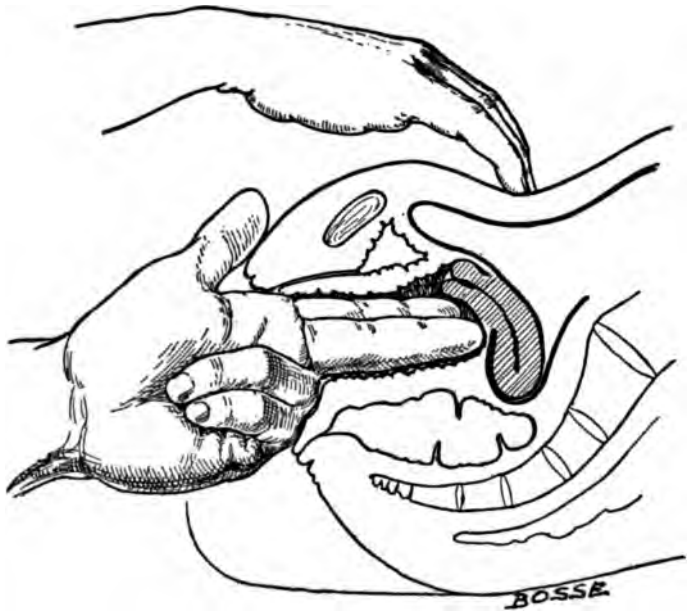

Fig. 6.—The examining fingers are in the posterior fornix palpating the fundus of a retroflexed uterus and noting the continuation of the cervix into the fundus. In this manipulation the external hand is of little importance.

be introduced high up into the posterior fornix, that the body must be pressed firmly against the elbow of the examining arm, and that the fingers should be introduced up toward the sacral promontory as when measuring the conjugate diameter in obstetric cases. If the uterus is not found in anteflexion or anteversion or in retroflexion, it must be retroverted (Fig. 7). The external hand then presses on the abdomen from the umbilicus down, and generally the uterus can be palpated, but very often the size, breadth, and thickness cannot be accurately made out. In

such cases the adnexa may be situated beyond the reach of the external and internal fingers.

The next step is to determine the mobility of the fundus if it is retroverted or retroflexed. The fingers are pushed high up into the posterior fornix and a retroflexed fundus should be lifted up. In freely movable cases the manipulation does not cause pain, but if the uterus or the adnexa are fixed by adhesions, this manipu-

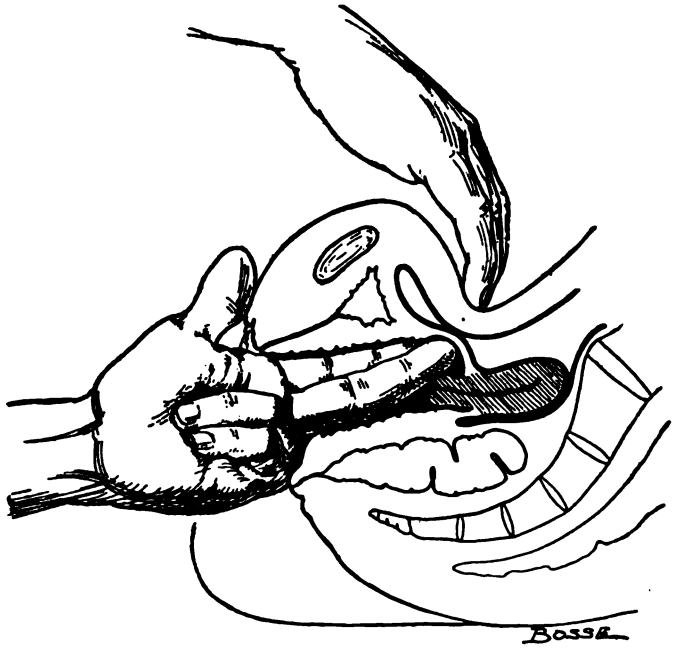

Fig. 7.—The uterus is not found in anteflexion or anteversion. If it is then not found in retroflexion (as in Fig. 6), it must be in the position known as retroversion, and the internal fingers, if introduced deeply into the posterior fornix, can feel the straight continuation of the cervix into the fundus.

lation is painful. To determine the mobility of the fundus, the second finger passes high up into the posterior fornix and lifts up the fundus, the index-finger is passed anterior to the cervix, and the cervix is steadily and constantly pressed downward and then backward. With this manipulation, unless the area of the internal os is very soft, the fundus will be elevated. If this manipulation is repeated gently but firmly several times, the fundus of a movable retroflexion, and surely the fundus of a retroversion,

will be elevated sufficiently to enable the fingers of the external hand pressing on the abdominal wall below the umbilicus to pass posteriorly to the fundus. Then by steady forward movement of these fingers toward the symphysis, accompanied by the pushing of the cervix backward and upward with the internal fingers, a movable retroversion and retroflexion can readily be brought into anteversion or anteflexion.

The above-mentioned manipulation of the fundus is often too painful to be carried out, and is often prohibited by adhesions of the posterior wall of the uterus or by adhesions of the adnexa. Adhesions of the posterior wall of the uterus repesent peritoneal bands, which may often be felt during this manipulation, especially if the internal fingers are passed high up into the posterior fornix. These perimetritic bands are sometimes stretchable and multiple, and must be distinguished from thickened or shortened uterosacral ligaments, which are only two in number, and which run backward and outward from the cervix. If such bands are not firm, and if the fundus can be brought somewhat forward so that the external hand can be behind it, further attempts at moving the fundus may be successful, but are generally prohibited either by pain, by firmness of the adhesions, or by adhesions of the adnexa, which thus limit mobility.

A most important point in the examination is to determine not only the mobility of the fundus, but the mobility of the cervix, which depends on its attached ligaments, particularly the broad ligaments and the uterosacral ligaments. It is important to determine the condition of the broad ligaments, of the uterosacral ligaments, and of the posterior parametrium. Fresh or old infiltrations in *the broad ligaments* are felt more or less closely connected with the uterus or more or less closely connected with the pelvic wall. Such conditions often cover the tubes and ovaries or prevent their bimanual palpation. In other cases, one or other of the broad ligaments are sclerotic or shortened, with or without the existence of vaginal scars running from cervical tears over to the lateral wall of the vagina. These not infrequently pull the cervix toward their side and prevent its being pulled or pushed to the other side.

The condition of *the posterior parametrium and the uterosacral ligaments* is a question of very greatest importance. In some

cases, as a result of parametritis, the posterior fornix is short and sensitive and pressure causes pain. Attempts to lift the cervix upward show mobility to be limited and produce pain. If this condition is not marked, the fingers should pass high up into the fornices, and by a steady manipulation the uterus should be lifted

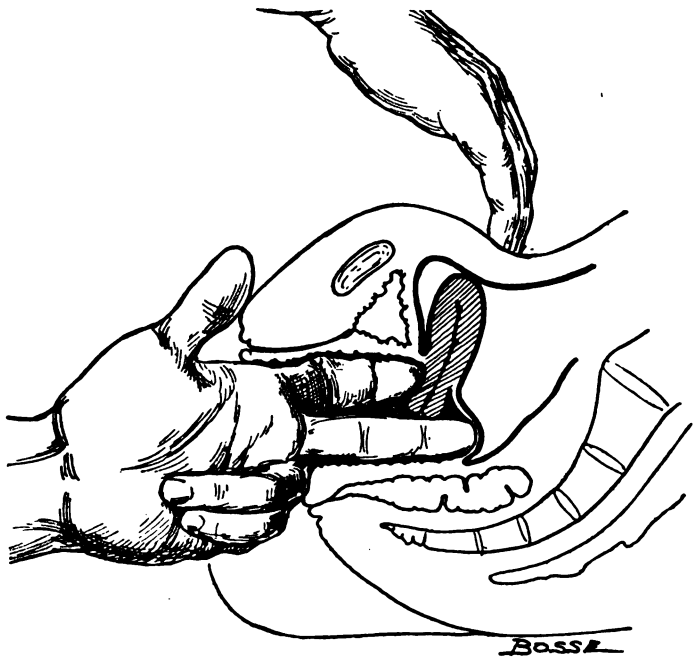

Fig. 8.—With the tip of the middle finger under the cervix in the posterior fornix, the uterus can be lifted up toward the abdominal wall and an anteflexed or anteverted uterus is brought into touch with the external fingers. This manipulation tests the mobility of the cervix, determines the degree of pain produced thereby, and puts the posterior parametrium and the uterosacral ligaments on the stretch so that the latter are readily palpated. If the uterus is retroverted or retroflexed both fingers must be introduced into the posterior fornix.

upward (Fig. 8) and held with the index-finger, and the second finger, moving from one side to the other, often finds the uterosacral ligaments lengthened and sensitive, or shortened and sclerosed and limiting the mobility of the cervix.

The internal fingers should palpate the pelvic wall, passing as high up as possible into the hollow of the sacrum, and then toward the lateral pelvic wall to determine the presence of exudates

or infiltrates or the presence of adherent tubes and ovaries, or of pyosalpinx or of movable or fixed prolapsed cystic ovaries or movable or fixed small ovarian cysts.

If, in the course of bimanual examination, the external hand feels a foreign body in one hypogastric region or the other, or in the median line between the symphysis and the sacrum, or above the true pelvis, we are concerned with the existence of a pregnant uterus, or of a fibroid uterus, or of a fibroid attached to the uterus by a pedicle, or of an ovarian cyst. We must determine whether we are dealing with an enlarged uterus (pregnancy or fibroid), or whether we are concerned with a cyst or solid tumor of the ovary or with a solid tumor attached to the uterine body by a pedicle (fibroid). The existence of pregnancy or fibroid uterus is determined by proving the continuity of the tumor felt by the abdominal hand with the cervix. This is done by gently palpating from above downward to the symphysis. Pushing upward on the tumor with the abdominal hand distinctly pulls the cervix with it. Tapping of the abdominal tumor with the hand is communicated directly to the fingers applied to the cervix. Pushing the tumor to one side or the other moves the cervix distinctly.

In the case of an ovarian cyst or a pedicled uterine fibroid the essential point is to prove the existence of a pedicle. This can be done by putting the patient in the Trendelenburg position. Pushing up on the tumor, we may feel with the external hand and with the internal hand a space between the tumor and uterus, and may actually feel the pedicle. Pushing such ovarian tumors upward does not pull the cervix upward. Marked tapping of the tumor is not readily communicated to the cervix. If the uterus can be made out to be of normal size, of course the abdominal tumor is proved to be either an ovarian tumor or a pedicled fibroid. This differential diagnosis is often aided by grasping the cervix with volsella. By pulling down on the volsella, a separation of the uterus from the tumor and the feeling of the pedicle is rendered more easy.

The differential diagnosis between pedicled fibroid of the uterus and solid ovarian tumor demands the finding and feeling of the pedicle, which is harder and firmer in the case of a fibroid than in the case of an ovarian cyst.

The existence of ascites in conjunction with the presence of an abdominal tumor, or without its presence, and the determination as to whether the fluid is free or encapsulated, is an important point, but often very difficult of determination.

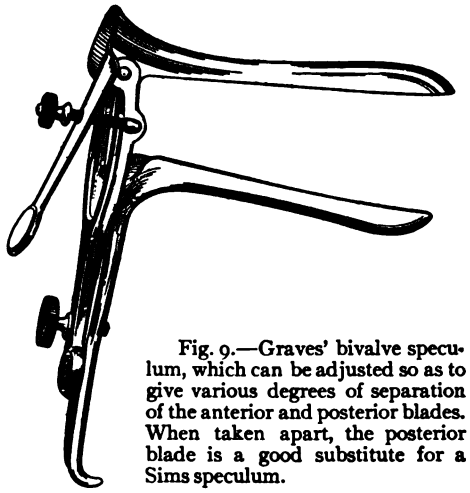

Fig. 9.—Graves' bivalve speculum, which can be adjusted so as to give various degrees of separation of the anterior and posterior blades. When taken apart, the posterior blade is a good substitute for a Sims speculum.

Examination by Specula.—Examination of the cervix, vagina, and uterine cavity and treatment of the same are carried out with the aid of specula (Figs. 9 and 10). The introduction of bivalve specula shows the color and character of the vault of the vagina and brings the cervix well into the field. The selected speculum should not be too long, else the fornix is too widely stretched and the cervix drawn high up and not readily reached. If the speculum

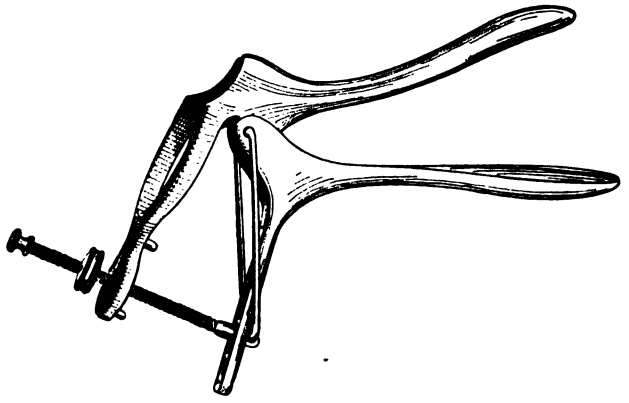

Fig. 10.—Brewer's bivalve speculum.

is too small, then the lateral walls of the vagina bulge into the lumen of the speculum and the cervix is not readily seen nor treated. For examination of the vagina and for its treat-

ment Ferguson specula are absolutely essential. When of the right size, anointed with soapsuds, and introduced with gentle rotatory motion, they give an excellent picture of the cervix, and by gradual withdrawal toward the vulva show the color, character, and lesions of the vaginal mucosa.

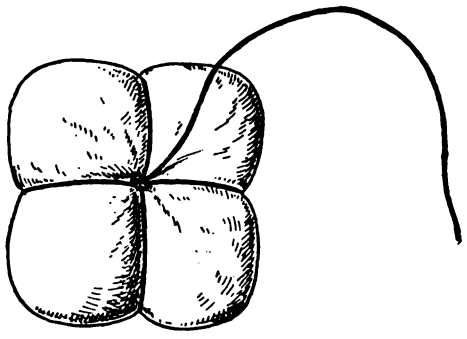

Fig. 11.—The Schultze tampon, made of cotton and introduced through a bivalve speculum and packed about the cervix, takes up during twenty-four hours the secretion from the cervix and uterus, gives us an idea of the amount and character of the cervico-uterine discharge, and furnishes the material for microscopic examination for pus cells, epithelia, and bacteria.

The use of the bivalve speculum discloses the cervix. We see the character of the outer covering of the vaginal portion, the character of the external os, the existence of erosions, or ulcers or ectropion. We see the character and color of the cervical discharge. The fornices are thoroughly sponged with lysol or carbolic solution and some of the cervical secretion is taken and a smear made for microscopic examination. If the cervix is free of mucus, or if it can be gently freed of mucus, a thin platinum loop may sometimes be introduced into the cervix and a smear made.

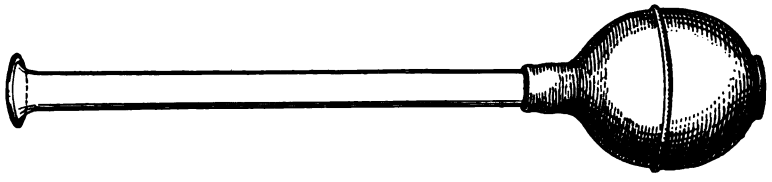

Fig. 12.—Long glass tube with ampulla and large rubber bulb to be introduced through a bivalve speculum and applied over the dried cervix to draw out by suction the cervico-uterine discharge for examination.

It is important to determine the character and amount of the cervical and uterine discharge, as distinguished from the vaginal discharge. For this purpose a fair-sized bivalve speculum is needed. The vagina and fornices are thoroughly cleansed with

lysol or carbolic solution. A square piece of absorbent cotton three inches square and fairly thick is taken and a piece of strong thread is tied about it just tight enough to slightly indent the sides. The cotton remains flat. Another piece of thread is tied about the cotton at right angles with the first thread, the knot of both of these being tied at the middle of the flat surface, and at the same point for each (Fig. 11). The cotton is then introduced with the side reverse to the knot uppermost, and is brought over the external os. The four corners of this flat cotton tampon are then pushed upward snugly into the four fornices of the vagina, the speculum is carefully removed, and the string is left hanging out of the vagina. At the end of twenty-four hours this tampon is removed, preferably after introduction of the bivalve speculum. Whatever secretion has been discharged by the cervix and the uterus during these twenty-four hours remains on the upper surface of the tampon. The mucoid elements are from the cervix. Pus thoroughly mixed with mucus means that the mucopurulent discharge has come from the cervix. One or more accumulations of pus free of mucus signify a uterine secretion. The distinction between the two can readily be made when the loop takes up portions of the discharge for the making of smears. The cervical secretion is thick and tenacious, while the uterine discharge is thick and not mucoid and is easily distributed over the surface of the slide. Another method of obtaining cervical secretion, and sometimes uterine secretion, is the use of suction. A long tube the size of a test-tube, with an upper trumpet end made to fit over the cervix like the end of a breast pump, and with a rubber bulb like that of the breast pump at the other end, can be inserted through the bivalve speculum and placed over the external os after the cervix has been thoroughly dried (Fig. 12). One or several applications

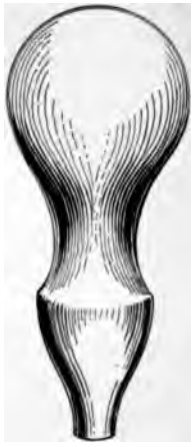

Fig. 13.—Large powerful rubber bulb to be compressed and applied closely into the outer end of a Ferguson speculum which has been introduced and pressed snugly into the fornix about the cervix. By its suction action it draws out the cervico-uterine secretion, and if applied for several minutes produces a uterine hyperemia which has the therapeutic value attributed to Bier's suction hyperemia.

to the cervix draw out from the cervical canal a serous, mucoid, or purulent discharge, and cause edematous swellings around the external os. In addition to this, long pipets may be introduced into the cervix, and if the bulb attached is powerful enough an intrauterine discharge may be obtained. In practically all cases,

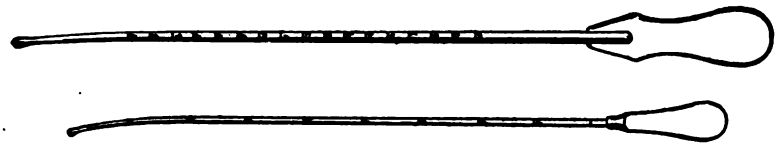

Fig. 14.—Uterine sounds for determining the position of the uterus, the length of the uterine cavity, the character of the endometrium, and the size, character, and sensitiveness of the internal os. They serve almost the same purpose when passed into the urethra.

however, the above-mentioned cotton pledget, the Schultze tampon, meets all the indications for obtaining the cervico-uterine discharge over a period of twenty-four hours. (See also Fig. 13.)

Uterine Sound.—In determining the character, structure, and condition of the uterine lining, and the size and length of the uterine cavity, we are often compelled to palpate the inner

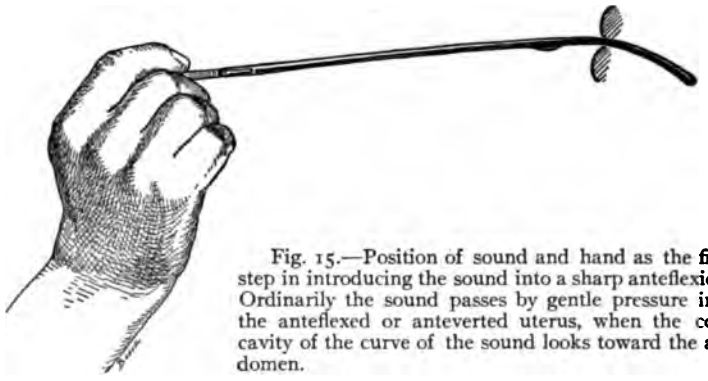

Fig. 15.—Position of sound and hand as the first step in introducing the sound into a sharp anteflexion. Ordinarily the sound passes by gentle pressure into the anteflexed or anteverted uterus, when the concavity of the curve of the sound looks toward the abdomen.

surface of the uterus with the aid of a uterine sound (Fig. 14). The uterine sound is sometimes necessary to define the position of the uterus when this cannot be accurately determined bimanually; to differentiate the uterus, by determining its position, from masses or tumors behind it or in front of it; to determine its length and thus corroborate the existence of a uterine fibroid

as against an extrauterine tumor, if the uterus is found to be very much enlarged. By some, the sound has been used to aid in restoring a retroflexed uterus to its normal position, a manipulation which is fraught with much danger. As a rule, however, the use of the sound can be dispensed with. It is an instrument which can do much harm. It may carry infection existing in the cervix up into the uterus. When used, only the gentlest manipulations are permitted; the vagina and cervix should be most thoroughly cleansed; the speculum should be a sterile one and the sound most thoroughly sterilized. In some cases, without marked anteflexion, or without marked retroflexion, the sound readily passes forward or backward, or straight in the direction of a retroversion. The handle of the sound should be held between the thumb and the first finger, and only the gentlest manipulation should be used. Ofttimes the sound does not slip past the internal os into an anteflexed uterus. The tip of the sound should then be introduced with the concavity looking downward until the point reaches the internal os; then, by rotating and moving the handle in a circular direction, the hand holding the handle describes a half circle to the right until the handle is as high as a plane

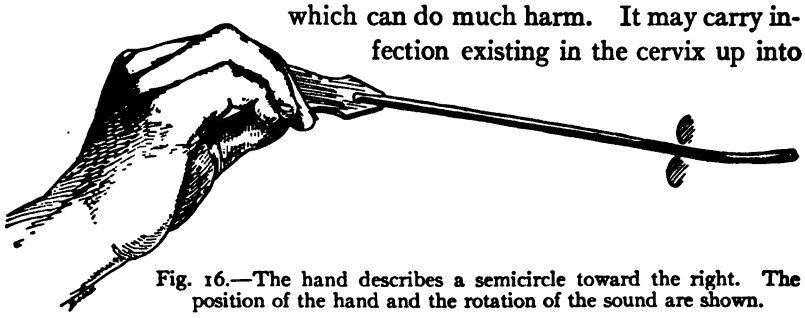

Fig. 16.—The hand describes a semicircle toward the right. The position of the hand and the rotation of the sound are shown.

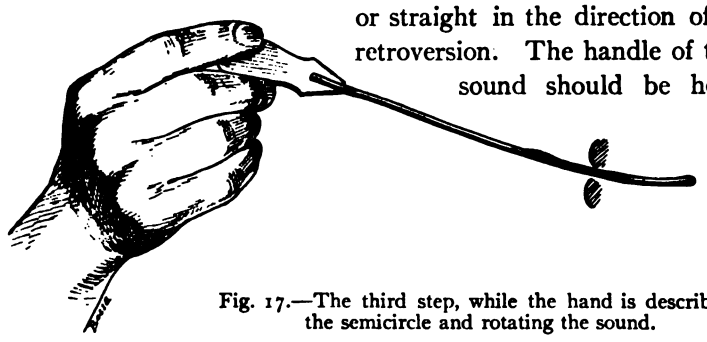

Fig. 17.—The third step, while the hand is describing the semicircle and rotating the sound.

extending from the abdominal wall, when the handle should be gradually depressed and the point slips up without the use of force past the internal os into the uterus (Figs. 15, 16, 17, 18). The very opposite manipulation is used in introducing the sound into a sharply retroflexed uterus. The sound is introduced as far as the

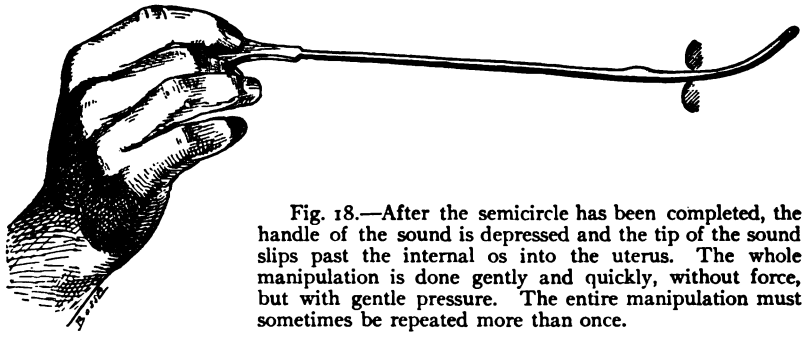

Fig. 18.—After the semicircle has been completed, the handle of the sound is depressed and the tip of the sound slips past the internal os into the uterus. The whole manipulation is done gently and quickly, without force, but with gentle pressure. The entire manipulation must sometimes be repeated more than once.

internal os; the handle is held between the thumb and first finger, as high as a plane extending out from the symphysis; the handle is then swung in a large circle to the left until it comes down to a plane level with the table, when it is then slipped through the internal os into the uterus (Figs. 19, 20, 21). It is often necessary to loosen the screw of the speculum and to pull the cervix down by volsellum before the sound will pass through the internal os of a sharply flexed uterus.

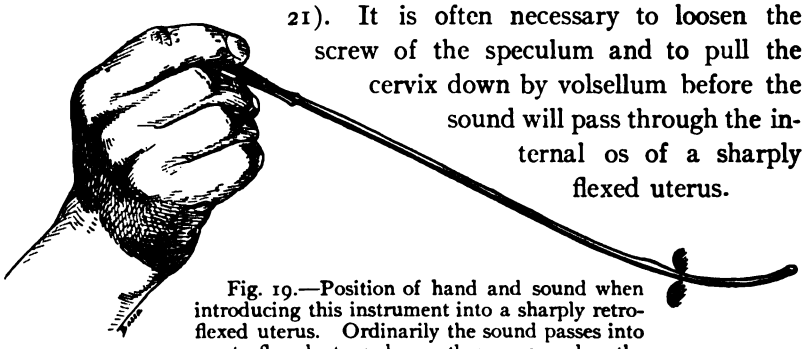

Fig. 19.—Position of hand and sound when introducing this instrument into a sharply retroflexed uterus. Ordinarily the sound passes into a retroflexed uterus by gentle pressure when the concavity of the sound looks down toward the table.

The sound determines: (1) the length and size of the cervix, the character of the constriction or stenosis of the external and internal os, and the sensitiveness of the same; (2) it determines the length and direction of the uterine cavity; (3) it informs us of

the size of the uterine cavity and the thickness of its walls; (4) it informs us of the character of the inner surface of the uterus and aids in determining the presence of new-growths; (5) it determines the mobility of the uterus; (6) it informs us of the sensitiveness of the uterine lining. Its use is contraindicated in pregnancy or on suspicion of pregnancy, in inflammation of the uterus and its surroundings, in hematocele, in purulent discharge from the uterus and vagina, in carcinoma of the

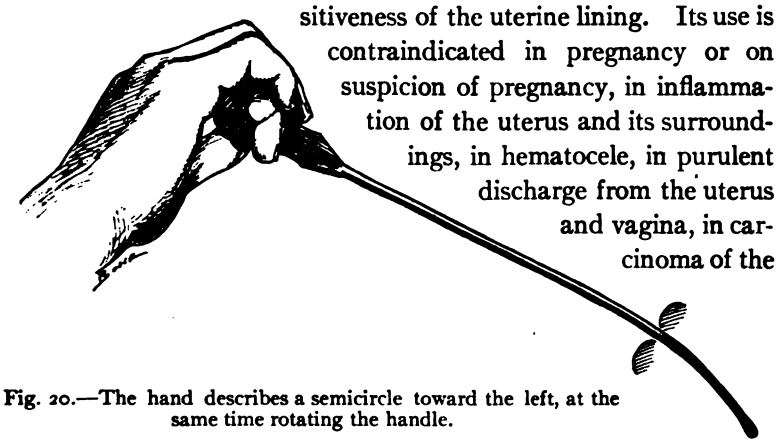

Fig. 20.—The hand describes a semicircle toward the left, at the same time rotating the handle.

fundus, and during menstruation. It should never be used through a Ferguson speculum.

Urethra and Bladder.—The introduction of the finger into the vagina, with palpation and manipulation and massage of the

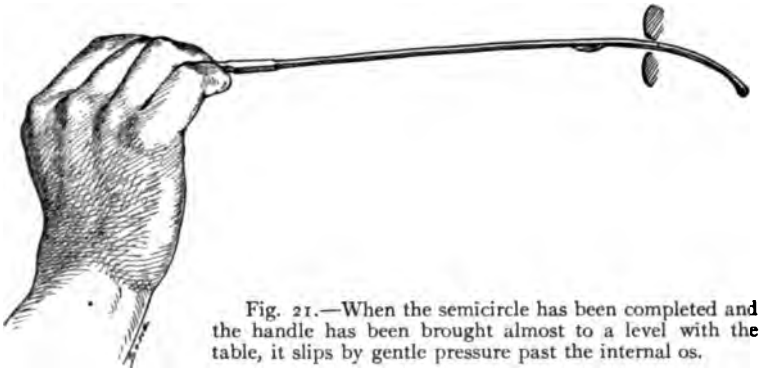

Fig. 21.—When the semicircle has been completed and the handle has been brought almost to a level with the table, it slips by gentle pressure past the internal os.

urethra along the anterior vaginal wall, shows the sensitiveness, the degree of infiltration of its wall, and the existence of areas of malignant induration and also expresses the urethral secretion (Fig. 22).

The uterine sound, when gently introduced into the urethra and gently passed over its entire surface, determines its sensitiveness, the presence of irregularities or new-growths, and the existence of stricture, as well as the sensitiveness of the region of the internal sphincter.

The diagnosis of the lesions in the urethra in chronic inflammatory conditions which do not yield to treatment and the diagnosis of the presence of new-growths demand the use of the endoscope, which is readily applied and readily used in the female. The endoscope shows the color and character of the mucosa, the exis-

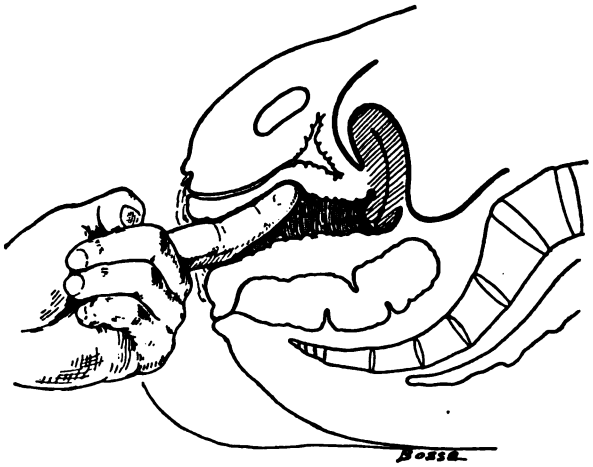

Fig. 22.—Massaging the urethra to determine its character and sensitiveness and to express any secretion contained in its lumen or in the urethral glands for the purpose of microscopic examination. This step often discloses a chronic urethritis and is to be done several hours after the last urination.

tence of plaques, of infected glands, of polyps, new-growths, and deep urethral caruncles.

The examination of the bladder should be always preceded by thorough examination of the urine which, in many cases, combined with the symptoms and a history of the etiology, suffices for the purpose of treatment. In complicated cases, in stubborn cases, and when blood is present in the urine, the use of the Otis, Nitze, or Tilden Brown cystoscope is necessary. For routine examination the Nitze or Otis examining cystoscope should be used (Fig. 23). The bladder is first washed out and filled with a clear

sterile water. The Nitze or Otis cystoscope is slightly anointed with sterile oil or glycerin, the cystoscope is gently introduced, the current is turned on, and the cavity of the bladder, to the minutest detail, is open to the eye, and all without discomfort to

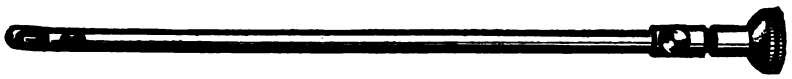

Fig. 23.—Otis examining cystoscope to be introduced into the bladder filled with sterile water after preliminary thorough irrigation of the bladder. The electric bulb furnishes a beautiful white light and the prism gives a splendid view of every bit of the bladder mucosa as the cystoscope is moved carefully forward and backward and rotated on its long axis. The patient is in a comfortable lithotomy position.

the patient (Fig. 24). The Tilden Brown instrument, especially adapted in length for use in the female, is extremely valuable and simple. The use of this cystoscope is frequently needed in diagnosing between involvement of the bladder and involvement of

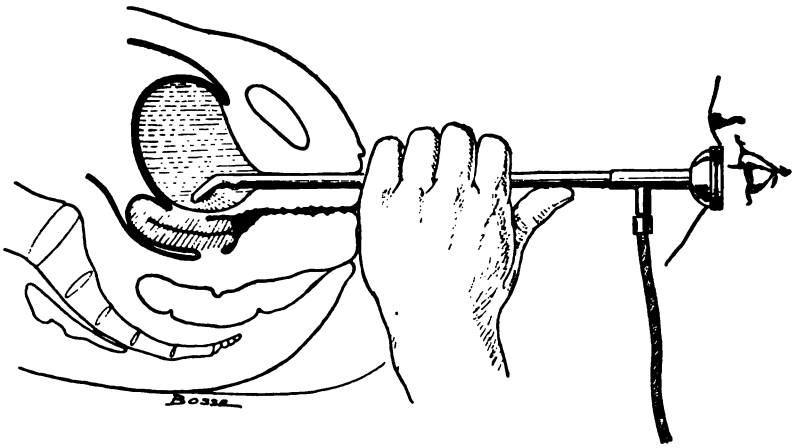

Fig. 24.—Examining cystoscope in the bladder previously irrigated and filled with water. The cystoscope is held with the left hand placed at a point which prevents the cystoscope from being introduced more than the desired distance, and so avoids pressing the electric bulb against the bladder mucosa. The elbow of the left hand is supported, if desired, by a rest attached to the lower end of the table.

the kidneys, to determine involvement of the kidneys as evidenced by the discharge of pus or blood from one or both ureters; for the purpose of catheterizing the ureters; for the purpose of examining the urine of the respective sides; or for determining the relative functional capability of the kidneys.

Ureter.—The ureter can be palpated by turning the palmar surface of the fingers in the vagina upward and passing up to the level of the internal os, when external abdominal pressure aids in disclosing a cord passing externally and posteriorly and downward into the broad ligament.

The ureters are readily catheterized with the aid of the short *Tilden Brown catheterization cystoscope*, of which the following is said:

The sheath (Fig. 25, A) is an oval tube carrying the illuminating lamp and its insulated electric conductor; two stop-cocks for irrigating; a screw for holding in place the obturator or the telescope.

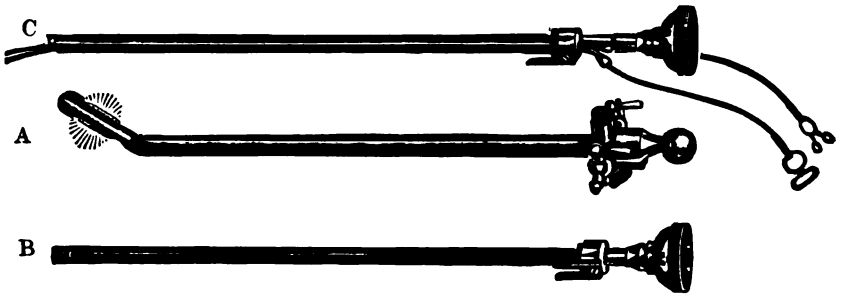

Fig. 25.—Tilden Brown cystoscope of short length, fitted solely for use in the female bladder and for the purpose of catheterizing the ureters. It is of especial value for examining the base of the bladder and the openings of the ureters.

The obturator is to be properly and securely in place when the sheath is passed into the bladder (Fig. 25).

Irrigating Cocks.—As soon as the obturator is withdrawn the open end of the sheath is occluded by the thumb of the left hand; while the hose attachment for filling the bladder by gravity is fitted by the right hand to the right-hand cock. The fluid is emptied from the bladder either by removing the thumb from the open sheath or by opening the left-hand cock. This washing is repeated until the distending fluid returns perfectly clear.

If one desires to have the bladder distended before passing the telescopic tube (Fig. 25, B) into the sheath, it can readily be secured without endangering escape of the medium by raising the ocular end of the sheath to such an angle that its open intravesical end rests on the trigonum; then on passing the telescope, it is important, just

before the latter has been pushed completely home, to lower the ocular end of the instrument, which at the same time lifts the vesical end and so prevents touching the bladder wall with the tip of the telescope. A little practice makes this easy to accomplish. Should the distending medium, however, escape while inserting the telescope, or should one wish to change the medium at any time during the examination while the telescope is in place, it becomes necessary only to couple the irrigation hose to the right-hand nozzle and open the cock.

The lamp is made so that it develops the least heat with the highest possible brilliancy. The safe point of illumination is when the light is almost white. If one is not familiar with the safe limit he should practice by turning on current slowly, watching the appearance of the lamp filament, and stop at the point where the red changes into white light. Test before introduction and turn off until needed, also turn off light at intervals of two minutes each to prevent excessive heat.

Source of current may be a six to eight cell battery with rheostat, or the incandescent lighting current; an accurately adjustable controller is to be used with the latter.

Catheterization Attachment (Fig. 25, C).—Alongside of the telescope are two channels for guiding catheters; the entrance to each is provided with a thin rubber tube to fit snugly around the catheter to prevent leakage; a rubber collar serves the same purpose where the telescopic shoulder fits against the sheath. Exert slight pressure on the eye-piece while fastening the nut. The art of catheterization is difficult and requires careful study. No one should attempt catheterization unless he has acquired the necessary skill and practical knowledge in the simple branches of cystoscopy, for which purpose this instrument serves very well by omitting the catheters.

As a preliminary step, and before any part of the examination has begun, the two canals of the catheterizing telescope should be properly equipped with sterile catheters having their tips all but protruding from the canals; while their outer free ends are covered with sterile rubber caps, which both prevents the escape of the distending medium as well as the access of any fluid to their lumen until the removal of the caps (Fig. 25, C). For obvious reasons

this is undesirable until after each catheter has been passed into its respective ureter. When bladder examination alone is to be made with this instrument the catheter canals are simply stopped with rubber caps.

Examination per Rectum.—Examination per rectum is often of the greatest aid, especially in virgins. The index-finger, well covered with a finger-cot and vaselin, is passed high up and readily feels the cervix. Lifting the cervix upward, the external hand easily feels an anteflexed uterus. By this manipulation a retroflexed

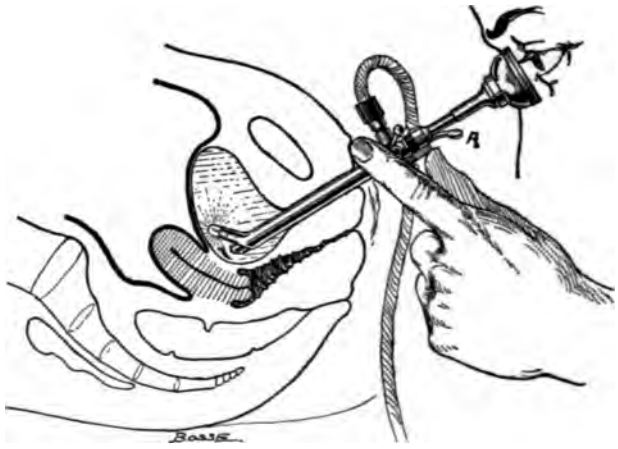

Fig. 26.—Tilden Brown cystoscope in the bladder filled with water and held almost at the angle requisite to passing the ureteral catheter into a ureter. The ureteral catheter is passed through the tube at *A* before the catheterization attachment (Fig. 25, C) is introduced into the sheath. These tubes, one on either side, are closed by rubber tips when this cystoscope is used simply for examination. The bladder is best filled with water before introducing the cystoscope with its obturator. The obturator is then taken out, the barrel is held upward at an acute angle, and the inner tube, without or with the ureteral catheters, is quickly introduced and fastened.

uterus can be readily palpated. A parametritic exudate on the posterior wall of the pelvis or about the rectum can be made out. Prolapsed tubes and ovaries and cases of salpingo-oöphoritis can be distinctly palpated, intrapelvic tumors can be felt, and their contour made out. The uterosacral ligaments and their character can be distinctly recognized.

BACTERIOLOGIC METHODS

Fixing Smears upon a Slide or Cover-glass.—In fixing specimens upon the slide or cover-glass for microscopic examina-

Fig. 27.—Showing the F. Tilden Brown cystoscope with the ureteral catheters introduced into the ureters. If it is desired to leave the catheters in place in the ureters for any length of time, the inner tube is drawn out gently while the catheters are pushed upward, and then the outer tube is withdrawn.

tion, it is essential that the smear be very even and thin. The smear is allowed to dry in the open air, in a thermostat, or by gently warming over a flame. It is then passed through the flame three times, if made on a cover-glass, or if on a slide until it is heated to a degree just tolerated by the back of the hand.

Staining for the Gonococcus.—The gonococcus is an organism occurring in the shape of oval or coffee-bean shaped bodies. It is generally grouped in twos or fours, and resembles the German biscuit in appearance. It is found either free in the discharge from the urethra or in the secretion of the cervix, or, as is more often the case, it is inclosed within pus and epithelial cells. In examining specimens on cover-glass or slide, attention should be paid only to the intracellular gonococci, for they alone can be considered diagnostic of gonorrhea.

The secretion is taken upon a platinum loop, spread upon a cover-glass or slide, and fixed by the ordinary method.

The staining is done in one of two ways: First, the simplest method is to stain the specimen for one minute in a 1 per cent. aqueous solution of methylene-blue, and then to wash it in water. The gonococci and the cells are both stained blue. If the characteristic diplococcus is found in the pus and epithelial cells by this method, one can be reasonably, but not positively, certain that the discharge is of a gonorrheal character.

A refinement of this method is the employment of the eosinate of methylene-blue (Jenner). In this stain the organisms are stained blue, while the granules of eosinophilic leukocytes, which are usually present in large numbers and which are considered to be a characteristic feature of the gonorrheal discharge, appear as a bright or brownish red. The smear is immersed five minutes in this stain, washed and replaced in water, dried with filter-paper, and mounted.

The second, known as the Gram method, is more diagnostic than the above, because it differentiates the gonococcus from other diplococci which may be present in pathologic secretions. The smears are fixed by heat and stained in a solution of gentian-violet (10 parts saturated alcoholic solution of gentian-violet to 90 parts of 25 per cent. solution of carbolic acid—Fraenkel). The solution should be placed in a watch-glass and the smear

allowed to rest upon the surface of the stain for three minutes. It is then blotted with filter-paper and without washing is covered with Lugol's solution (1 grain of iodin, 2 grains of potassium iodid, and 300 c.c. of distilled water) for two minutes, then blotted with filter-paper and washed immediately in 95 per cent. alcohol for thirty seconds, or until the blue stain ceases to come away, when it is at once washed in water and counterstained with an aqueous 1 per cent. solution of Bismarck-brown or of acid fuchsin. By this method the gonococci are stained brown or red, depending upon the counterstain used, while the other cocci, which may be present in the discharge, are stained blue.

Fixing Slide for Tuberculosis Stain.—In staining for the bacillus tuberculosis the smears of the discharge are fixed in the ordinary manner and are stained for one minute to three minutes in Ziehl-Neelsen's carbol-fuchsin stain (90 parts of a 5 per cent. solution of carbolic acid and 10 parts of a concentrated alcoholic solution of fuchsin). While staining, the spread is held over a flame until steam appears, and is kept there without being allowed to boil. It is then blotted and placed either in a 20 per cent. solution of nitric or of sulphuric acid for about one-half minute, when it is, without washing, placed in 95 per cent. alcohol and moved to and fro until the preparation loses all its red color. It may, however, be necessary, in order to facilitate this latter change, to repeatedly re-immerse for a few seconds in the acid solution and then again in alcohol. After decolorization it is counterstained by a concentrated solution of methylene-blue for a few seconds, then washed off in water and mounted in balsam. The tubercle bacilli will be stained red and all the other bacteria and cellular elements will be stained blue.

Preparation of Centrifuged Sediment of Urine for Microscopic Examination.—The sediment is usually examined for crystals, casts, cellular elements, and for bacteria. The cellular elements comprise leukocytes, erythrocytes, epithelial cells from the bladder, ureter, or kidney, and shreds of tissue from a neoplasm.

It is sufficient in demonstrating casts or crystals to place some of the sediment under a cover-glass and examine without further preparation.

In examining for pathogenic bacteria, including tuberculosis, the sediment should be spread upon several slides or cover-glasses and allowed to dry slowly either in the thermostat or in the open air. They should be covered to protect them from dust, and the amount of sediment on each slide should not be too great in quantity, so as to avoid too thick a smear or spread. If the smears are too thick, a film is formed which will not adhere to the glass. After drying, pass through a flame, as is done ordinarily in fixing smears, and then stain.

This method will stain the cells as well as the bacteria; but if special attention is to be paid to the cellular elements, it is better, after the spreads are dried, to fix them in a solution of equal parts of strong alcohol and ether, or 5 per cent. formalin, anywhere from five to ten minutes, and then wash in water. This likewise applies to the fixation in preparation of any shreds of tumor tissue which may be found in the sediment or floating in the urine. Methylene-blue and eosin or hematoxylin and eosin may be used as a stain for the tissue.

When tuberculosis is suspected, the sediment should be obtained from a catheterized specimen of urine in order to avoid confusion with the smegma bacillus. If this is impossible, the spread should be stained with carbol-fuchsin and decolorized in acid and alcohol and then, before counterstaining, should be placed in 95 per cent. alcohol for at least twelve, and better twenty-four, hours. Then counterstain, and if any red stained bacilli remain, they are in all probability the tubercle bacilli.

Cultures for Gonococci.—The gonococcus grows best upon serum-agar media. A small loopful of the discharge is transferred from a platinum loop to a platinum spatula and drawn or streaked across the surface of a serum-agar culture plate, or the loopful may be placed at one point on the surface of the plate and streaked across with the spatula. As many as five or six streaks may be made on one plate, and the individual colonies of gonococci will subsequently be found along the line of the streaks last made.

Cultures from Urine.—Urine from which cultures are to be made must be obtained by catheter in a sterile flask or bottle, and then sent to a laboratory for bacteriologic examination. No

chemical substance should be put in the urine with the idea of preventing decomposition.

Inoculation of Guinea-pigs for Tuberculosis.—The urine to be used for inoculation must be obtained by catheter in a sterile receptacle and allowed to stand until a sediment has formed. This sediment is then removed and centrifuged in a sterile tube. It is well, when possible, to wash the sediment several times with sterile normal salt solution, especially if the inoculation is to be intraperitoneal. After the sediment has been concentrated as much as possible by centrifuging, it is drawn up into a syringe and the guinea-pig inoculated either intraperitoneally, under the integument of the abdomen or of the inner surface of the thigh. Shaving of the skin and washing with some antiseptic solution is all that is necessary in the preparation of the guinea-pig.

The inoculation under the skin is, as a rule, preferable to intraperitoneal injection, for the reason that there is less chance of killing the animal by sepsis.

Occasionally the sediment may be too thick to be drawn into the syringe, in which case it will be necessary to dilute it, either with sterile normal salt solution or with sterile bouillon. As a rule, 2 c.c. of either the sediment or its suspension is sufficient for the test. It is essential, after the guinea-pigs have been inoculated, that the animals be kept under the best possible hygienic conditions. If tuberculosis develops, the animal will generally die anywhere from within four to six weeks. If it lives after the expiration of this time, it should be killed and the autopsy performed.

If the animal has been inoculated subcutaneously, either in the abdomen or thigh, inguinal glands will generally appear and grow quite large within two or three weeks if tubercle bacilli are present.

Staining for the Spirochæta Pallida (Schaudinn).—It is essential in examining spreads for the Spirochæta pallida that they be made very thin. The discharge from an ulcer or from the initial lesion may be examined, but it is better, after first removing the discharge from the surface, to get the serum which may be expressed from the lesion. The spread is allowed to dry, then fixed in 95 per cent. alcohol for one hour, then placed in Giemsa's stain (Grübler) for ten minutes to one hour; wash in

water, dry with filter-paper, and mount in balsam and examine with the immersion lens.

The spirochæte are from 4 to 14 mm. in length, very thin and delicate, pointed and drawn out to a fine filament at the end. They have from six to fourteen convolutions and they are sharp, narrow, and screw-like. They have very little affinity for the anilin dye and hence stain very faintly. It requires very careful search to detect them.

HEAD ZONES

Head has described certain definite and constant areas of cutaneous tenderness associated with diseases of the different viscera. He found in many visceral affections that if the sensitiveness of the skin was tested by running a pin point over the cutaneous surface, there could be shown to exist areas over which there was a more or less marked hypersensitiveness to pain. These areas are constant and distinct; they can be mapped out on the surface of the skin, and when present are a most infallible sign of an affection of the organ to which they correspond. The skin tenderness is very superficial, quite different from tenderness on pressure, and extends over definite areas which never overlap one another. Each area, or zone of hyperalgesia, has a maximum region which often corresponds to the location of the pain complained of by the patient, and coincides with the areas marked out in patients suffering from attacks of herpes zoster. There is an intimate association between the central connections for the nerves of the viscera and the nerves which supply the sensations of pain, heat, and cold, and those which exert trophic influences on the skin. The areas correspond to segments of the spinal cord, not to the distribution of the peripheral nerves or spinal nerve-roots or brain areas. The zones of each side never extend beyond the median line in front or behind (Elsberg and Neuhof).

A sharp pin is held between the thumb and index-finger of the right hand, the nail of the index-finger resting on the patient's skin. The pin is then made to traverse slowly the surface of the skin, care being taken that the nail of the index-finger presses equally along the area examined. The patient is instructed to say "Now" as soon as the pin stroke becomes painful. The pin

traverses the abdomen from side to side and from above downward. The points at which the patient complains of pain are marked. In this manner it is possible to map out the hyperalgesic area on the skin, and when such an area has been found the pin is made to approach it on all sides, so that its form and position may be determined. Care must be taken that the pressure of the pin point remains constantly the same, especially as the pin passes over the groin and slips off the costal border or over the crest of the ilium. After the zone has been thus mapped out on the skin, the procedure is repeated a second time. It is a good plan for the operator to control both patient and himself by keeping both his and the patient's eyes away from the pin. There is considerable variation in the sensitiveness of different persons. It is, therefore, of advantage first to gain an idea of the general sensitiveness to pain on the part of the patient. For this purpose Libman's test is of value. If one makes pressure with the thumb over the styloid process in the neck, one may gain a fair idea of the degree to which an individual is sensitive to pain. Some patients will complain of the slightest pressure, in others a considerable degree of force is required. It is often a good plan to control the patient's statements by testing the skin near the spine on the side opposite to that upon which the zone has been found. This to be done without the knowledge of the patient (Elsberg and Neuhof).

The hyperalgesia is sometimes so marked that the patient will shrink or cry out as soon as the border of the zone is reached. The zones appear early in the course of visceral affections and usually persist throughout the course of the disease. They disappear at once with the relief of the lesion. The zones may appear after palpation, when they were not present before. The characteristic zone for the appendix may appear after palpation of the right iliac region in acute appendicitis, the zone for the uterine adnexa may appear after a bimanual examination. The presence of an ice-bag, a hot-water bag, or a poultice may make it impossible to map out the sensitive area, but if ice-bag or hot-water bag is removed, the hyperalgesic zone will appear after about fifteen minutes. The zones may disappear after repeated examinations. After a short interval the hyperalgesic area again appears. The presence of a Head zone alone must not be the only factor in arriving at a diag-

nosis, it must be used in conjunction with other signs and symptoms. In not a few patients with marked abdominal distention and rigidity the presence of a characteristic zone aids very much in making a differential diagnosis between diseases of gall-bladder and appendix, between diseases of gall-bladder and kidney, between diseases of the appendix and the female adnexa. There is no constant relation between the severity of the pain or the gravity of the lesion and the degree of sensitiveness of the skin. There may be very marked zones with little subjective pain and slight lesions, and only slight hyperalgesia in patients with very severe pains and grave lesions.

The zone appears on that side of the body on which the affected organ has its nervous connections; the side on which the organ is normally situated. If an organ belongs on the left side, the hyperalgesic zone will be found on that side, even if the organ, through disease or mobility, lies on the other side of the body.

The presence of a characteristic zone is evidence of an affection of the corresponding abdominal viscus, although not of necessity the affection which is causing the symptoms.

The zones are present in a large percentage of patients with acute affections of the appendix, of the gall-bladder, of the uterine adnexa, and are of considerable value in the diagnosis of these acute affections.

Zones are frequently present in acute diseases of the other abdominal viscera, and when present aid in making the correct diagnosis.

Cutaneous hyperalgesia may appear early in acute abdominal disease. Its presence is no index of the gravity of the lesion. Its sudden disappearance may be of grave significance.

In the absence of all other localizing signs or symptoms, the zone may indicate the affected organ. In most instances, however, it must not be used to make the diagnosis, but only as a diagnostic aid to substantiate conclusions reached from a consideration of all the symptoms and signs (Elsberg).

Gall-bladder and Liver.—A zone is present in acute affections of the gall-bladder more often than in any other acute intra-abdominal affection. The recognition of the disease is often difficult or impossible in stout patients without jaundice with

marked abdominal distention and rigidity. These patients may refer their pain to the right lower abdomen, and may have their tenderness in this region. Acute intestinal obstruction, acute pancreatitis, or acute appendicitis are diagnoses often made. In

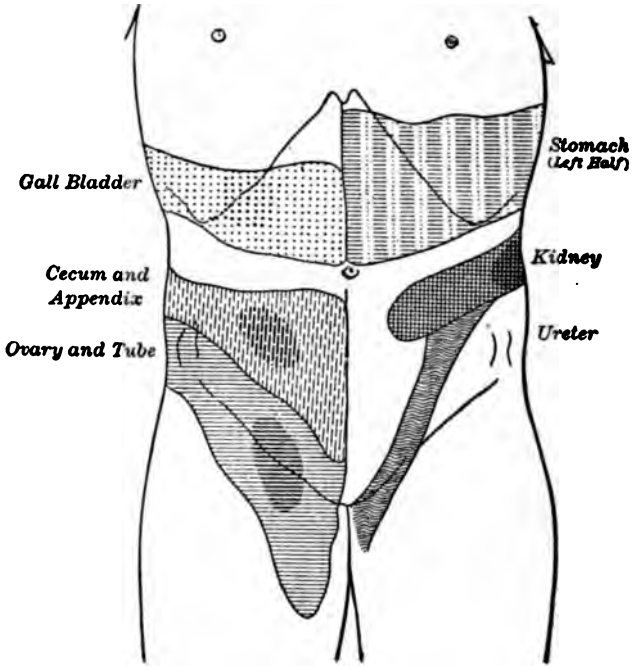

Fig. 28.—The general location and outline of the zones of cutaneous hyperalgesia for some of the abdominal viscera. Anterior view. The maxima are deeply shaded. Only the left half of the gastric zone is given. The ureteral zone consists of a series of maxima (diagrammatic) (Elsberg and Neuhof).

some patients the presence of a zone of hyperalgesia has been the only localizing sign.

"The zone lies in the right half of the abdomen, above the level of the umbilicus. The complete zone starts exactly at the median line in front, extending from some distance below the xiphoid to a short distance above the navel. Tracing it backward, it slants obliquely upward, and becomes narrow, passing partly over and partly below the costal arch. It is narrowest at the midaxillary line, where it is about 2 inches wide. Posteriorly, it becomes broader, and at the spine it is about as wide as in front. In some

cases more or less of the anterior portion only has been present (maximal area)" (Elsberg and Neuhof).

Kidney and Ureter.—"The kidney zone is wide at the posterior median line, where it begins, and gradually narrows anteriorly. Its greatest breadth is at the spinal column. It narrows to make

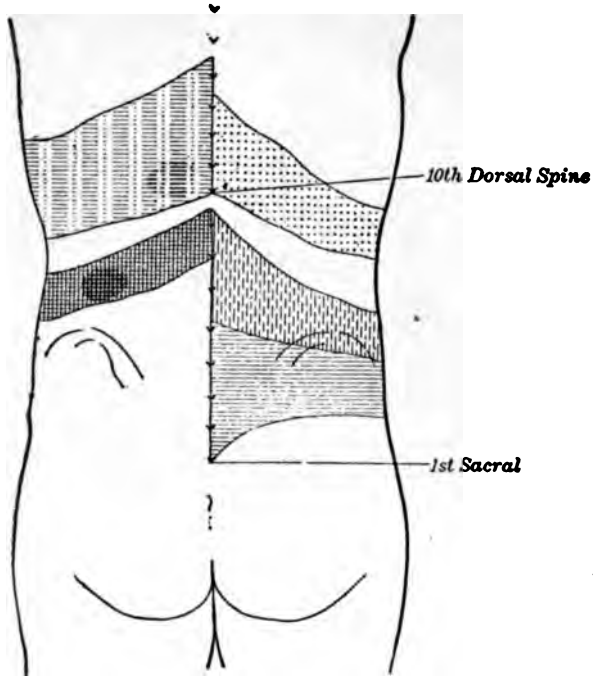

Fig. 29.—The general location and outline of the posterior parts of the zones (diagrammatic) (Elsberg and Neuhof).

a triangular area, with a rounded apex, situated a little to that side of the anterior median line on which the zone lies. Each zone is strictly limited to its half of the body. There is no difference in contour between the right and left kidney zones. The kidney zones are complicated by the additional ureteral zones that are present in certain cases. The ureteral zone springs, so to speak, from the lower margin of the kidney zone at the anterior axillary line. In an average adult it is about 3 inches wide at this beginning. It narrows in its downward course and, passing obliquely downward and forward, it terminates on its side of the

labia. After the first narrowing it widens again well below the umbilical level. There are anterior and posterior kidney maximal areas. The ureteral zone seems to be made up of a series of maxima. The kidney and ureteral zone is most often present, as in the *other intra-abdominal affections, in the presence of pain and tenderness.*"

Vermiform Appendix.—"The zone begins at the median line in front, sometimes a little to its left, from a point a short distance below the umbilicus to one equally distant from the symphysis pubis. It narrows toward the anterior axillary line to a width of about 2 inches (average adult). From this line it widens and spreads to the posterior median line from the eleventh dorsal to the second lumbar spines (approximately). At the anterior median line there is often a tongue-like downward extension of the zone (see Fig. 28). There is an anterior maximal area which is sometimes present alone. It may be that the "appendix" zone is really an "appendix and cecum" zone, because the cecum is so frequently involved in appendicitis. Sometimes, when an ice-bag has been employed over the appendix region, only the posterior half of the zone is present."

Diagnosis has been aided in a considerable number of patients by the presence of the zone, especially in that large class of acute cases in which the abdomen is rigid and there is no palpable mass. The zone has been of the greatest value in helping to differentiate between diseases of the appendix, on the one hand, and those of the gall-bladder or right uterine adnexa, on the other (Elsberg).

If the patient complains of symptoms which resemble appendicitis, and a zone is not present in the right lower abdomen, it is well to look elsewhere for hyperalgesia. In the majority of cases of chronic appendicitis or, more properly, cases of appendicitis admitted for operation in the interval, no zone is found.

Uterus and Adnexa.—"The zone for the right adnexa lies on the right half of the median line; that of the left adnexa, on the left half; the zone for the uterus is a combination of the two. Beginning some distance above Poupart's ligament, the upper margin of the zone runs parallel to it, and pursues this obliquely upward course to the spine of the second lumbar vertebra (approximately). The lower margin is a long, tongue-like process that extends halfway down the thigh on its inner aspect. The lower margin, as it passes

a short distance below the anterior superior spine of the ileum, approaches the upper, the average breadth of the zone here being 3 inches. The lower border then passes horizontally backward over the buttock to reach the posterior median line partly over the sacrum. Sometimes the upper half of this zone is better developed, sometimes the lower; these may be considered maxima."

"Diagnosis of diseases of the uterus has not been greatly aided by the presence of a zone. In about half of the cases of dysmenorrhea and of endometritis with pain, the zone is present. Some cases of retroflexion, retroversion, anteflexion, and prolapse show the zone. It is present in cases of uterine polyp with pain. It is rarely present in tumors of the uterus. In inflammatory diseases of the tubes and ovaries, especially those of the right side, the zones are of diagnostic value. There are no zones in a large number of patients with tumors and cysts of the ovary" (Elsberg and Neuhof).

METHODS EMPLOYED IN MEDICAL TREATMENT

THE URETHRA

In the treatment of inflammatory conditions of the urethra a glass pipet of a greater diameter and length than a straight eye-dropper, and with a large bulb, fulfils all indications (Fig. 30). When introduced half-way into the urethra, gentle pressure on the bulb bathes the posterior half of the mucosa, the fluid flowing into the bladder. As the tip is pulled out a slight distance, pressure on the bulb forces the fluid into the urethra, but it returns externally, bathing the anterior part of the urethra. When strong solutions are used, it is advisable to inject salt solution or some antiseptic solution into the bladder to prevent the irritation of this organ by

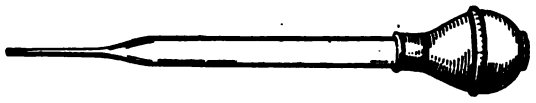

Fig. 30.—Glass pipet with fair sized rubber bulb employed for injecting various solutions into the urethra in the treatment of urethritis. Before injecting strong solutions into the urethra the bladder should be filled with some fluid to dilute whatever of the drug injected into the urethra may pass into the bladder.

the silver fluids or strong solutions which may enter it from the pipet.

Wooden or metal applicators wrapped with cotton and dipped in various solutions may be introduced into the urethra (Fig. 31). Better still, the tip of a Braun intrauterine syringe is covered with cotton and introduced into the urethra. The fluid in the barrel is then injected and the cotton becomes saturated with the medicament. The tip may be withdrawn and the cotton may be left *in situ* for any desired length of time.

In some cases of urethral involvement it is necessary to dilate the urethra, and to follow the dilatation by local applications. Hegar dilators, such as are used for dilating the cervix, fulfil all the indications.

In the treatment of chronic conditions it is sometimes necessary

to introduce into the urethra medicated pencils or bougies made of a base consisting of cacao-butter or cacao-butter and talcum, or glycerin.

The urethra may be irrigated by injecting fluids directly into the bladder without the aid of a catheter. The syringe is protected by a rubber tip, and this procedure can be readily carried out. The patient may pass this fluid, and thus the urethra is again washed with the desired medication.

In very chronic cases, where the tubular endoscope is needed

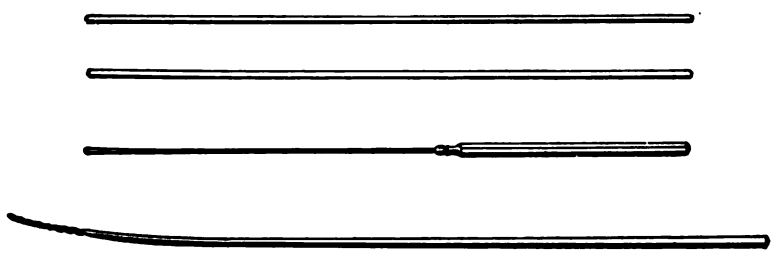

Fig. 31.—Wooden and metal applicators to be covered with a thin layer of cotton for applying various solutions to the urethra when long contact of the solution with the urethral mucosa is desired.

also for diagnosis, topical applications or cauterization may be made to the involved areas with the aid of such a tubular instrument.

THE BLADDER

In the treatment of involvements of the bladder, irrigations, instillations, and topical applications are used. Irrigations are best carried out by the use of rubber catheters with trumpet-shaped outer ends. A large piston syringe made of glass, with or without metal trimmings, and containing several ounces is all that is needed (Fig. 32). With such a syringe the fluid can be injected with varying degrees of pressure. By removing the syringe the fluid is readily drained out. Another value of the piston syringe is that we can gage the capacity and resistance of the bladder, and in the treatment of chronic cases of "shrunken bladder" steady pressure can be used to distend the bladder (Fig. 33). By increasing the amount of fluid injected at each sitting, in the course of weeks or months the capacity of the bladder can be very much

increased. The piston syringe gives us the ability to accurately judge the amount of fluid injected. Such glass syringes can be readily kept clean and sterilized. Instillations are made with this

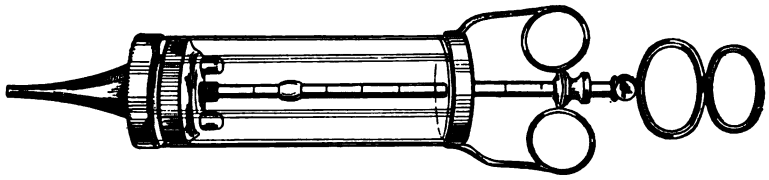

Fig. 32.—Piston syringe used for injecting fluids through a rubber catheter into the bladder for irrigation or treatment. With it, the amount injected can be controlled and varying degrees of force can be used for distending the bladder, a procedure which is often of therapeutic importance, especially in the case of "shrunken bladder."

syringe and a rubber catheter, or with the glass pipet introduced through the urethra into the bladder. The bladder may be irrigated with the aid of a glass funnel attached to a rubber tube, using then a rubber or glass catheter.

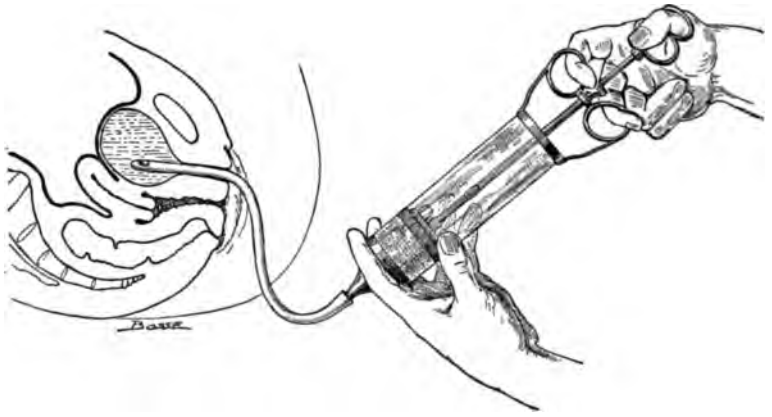

Fig. 33.—Shows piston syringe connected with rubber catheter in the act of injecting fluid into the bladder. The trough of the table, pictured in Fig. 1, catches the fluid as it is allowed to flow out through the catheter.

Topical applications in the treatment of solitary ulcers or single or multiple tubercular foci, or for the painting of the trigone alone, rarely demand the use of the Kelly cystoscope.

GLANDS OF THE VULVA AND URETHRA

These are numerous small glands in the vulva, especially about the urethra, in the vestibule, and in the fossa navicularis, which when infected secrete a purulent or mucopurulent discharge, without these glands taking the form of pustules.

These are infiltrated, swollen, suppurating follicles which must be destroyed with the silver stick or the actual cautery. These are frequently present with a chronic gonorrheal vulvitis and often escape attention.

In the treatment of infections of the glands of Skene, a hypodermic needle and syringe are used, the needle having a smooth dull tip. It is introduced into the duct and various of the silver

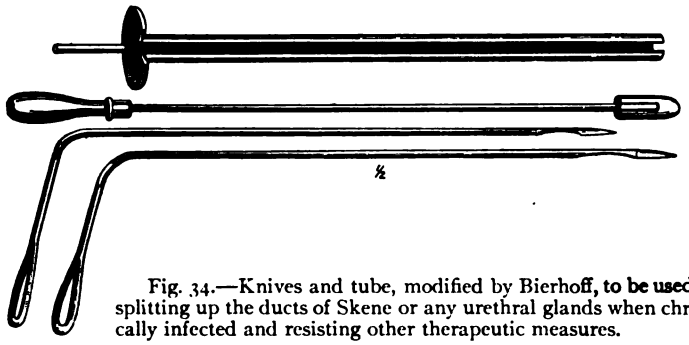

Fig. 34.—Knives and tube, modified by Bierhoff, to be used for splitting up the ducts of Skene or any urethral glands when chronically infected and resisting other therapeutic measures.

salts may be injected. If this fails to correct the condition, the urethra should be dilated, the ducts should be split open and cauterized with acids or with the cautery. This treatment can usually be done with the aid of cocain.

The ordinary endoscopic tube is of little value for opening paraurethral passages situated near the external meatus. Bierhoff has devised a fenestrated endoscopic tube, the slit being 2 mm. wide. It is inserted so that the fenestrum lies directly over the orifice of the infected duct. The tube in this way protects the remaining circumference of the urethral wall (Fig. 34).

The knife is inserted into the duct, and it may be slit along its whole length without danger of injuring the rest of the urethral wall, or else a fine probe may be passed into the duct and incision made upon it.

The tube is introduced with the obturator in place. On withdrawing the obturator the opening of the duct is brought into the slit and then the incision is made.

Treatment is often necessary in the involvements of the ducts and glands of Bartholin. If it is desired to use applicators, the outer opening of the duct must be incised under cocain. After this is healed, local applications to the duct or injections into the gland may be made. In chronic cases which do not yield to treatment, the gland may be injected with solutions with the aid of a hypodermic needle, the needle being introduced straight into the gland through the vulvar mucosa without passing through the duct.

In abscess of the gland, free incision is made, followed by irrigation and cauterization to destroy the so-called pyogenic membrane. Iodoform packing is used and kept in place by sutures. Healing generally takes place. In chronic swelling of the gland and in cysts of the gland of Bartholin the whole glandular structure must be excised.

THE VAGINA

Treatment of the vagina may be carried out by the use of medicated vaginal douches, by bathing with the aid of the Ferguson speculum, by introduction into the vagina of tampons, or by the application of drugs with the aid of other specula.

Douches.—Douches may be of various temperatures and contain any of the various antiseptic, astringent, or soothing solutions. Cool temperatures are to be used in acute inflammation, tepid in subacute, and warm or hot in chronic involvements of the vagina. The drugs used are healing lotions or antiseptic fluids, or astringent remedies.

Douches are especially used in the acute stages of vaginal inflammations, and are now in general use for cleansing purposes and to aid in the correction of vaginal and cervical irritations. Their best purpose is to supplement local treatment by the Ferguson baths.

In the use of the douche, glass tips or tubes are desirable (Fig. 35). The douche is best taken in a lying position, especially if the effect of temperature is desired. The patient should then lie

quietly for fifteen minutes to one-half hour. The douche should not be given at too high a pressure. When hot, it is very valuable in excessive bleeding and in stubborn inflammation of uterus and adnexa. It may be given once or twice daily, but with a marked discharge as often as four to six times, especially in acute conditions.

It the patient is careful and cleanly, a douche with tepid water during menstruation is not contraindicated.

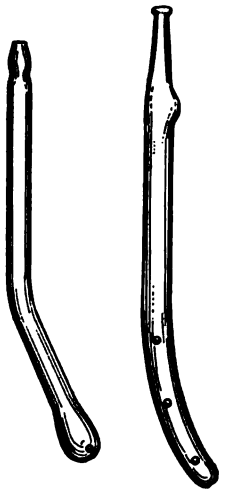

Fig. 35.—Glass douche tips to be attached to the tubing of a fountain rubber bag when taking vaginal douches.

Ferguson's Speculum.—At least three different sizes of Ferguson specula, of a length of 12 cm., should be in use. An internal examination should precede the use of the speculum in order to judge the size and length of the vagina and the size and resistance of the introitus (Fig. 36).

The speculum, well disinfected, should be taken in the right hand. The left hand separates the labia minora. With the aid of the thumb and two first fingers this manipulation gives a distinct view of the hymen, vestibule, and periurethral glands, the urethra and the fossa navicularis. The speculum is best moistened with soapsuds. The point of the speculum is introduced with pressure against the posterior vaginal wall and perineum so that the urethra is not pressed on (Fig. 37). With a slight rotary movement of the speculum it is pressed forward and directed at first horizontally, and then with its point directed downward.

Fig. 36.—Ferguson speculum for clear examination of the cervix and vagina, for giving vaginal baths and applications. Through it the cervix may be scarified or ovula of Naboth may be opened. Through it the long vaginal tampon (Fig. 50) may be introduced. When the speculum is drawn out slowly, the vagina may be dusted with powder with the aid of the powder-blower (Fig. 51). Into its outer end the large bulb (Fig. 13) may be firmly introduced and a powerful suction action may be exerted on the cervical and uterine canals or a marked uterine hyperemia may be produced (Bier's hyperemia).

The vaginal walls may be looked at as the speculum is being introduced, or else the cervix is first brought into the field of view and the vaginal walls are examined as the speculum is drawn forward.

Fig. 37.—The method of introducing the Ferguson speculum. The speculum is made slippery by soapsuds. The labia are separated by the thumb and index-finger of the left hand. The tip of the speculum is placed on the posterior wall of the vaginal opening, the speculum being held at the angle indicated. The tip of the speculum is pressed down firmly on the posterior vaginal wall and by a gentle rotary motion the speculum is introduced into the vagina. The diameter of the speculum must be fitted to the size of the vaginal outlet as determined by the condition of the perineum and the levator ani muscles.

The anterior and posterior vaginal walls lie close together, and are being spread by the introduced speculum. Hence, a very good

view is given as this instrument is being first introduced. The cervix appears smaller in this speculum than it does in the bivalve, and cervical tears appear very slight.

No intrauterine manipulation can be attempted with this speculum. It is used for the examination of the vagina and the vaginal portion of the cervix. With this speculum scarification of the cervix can be done, ovula of Naboth may be opened, and drugs may be applied to the vaginal portion of the cervix.

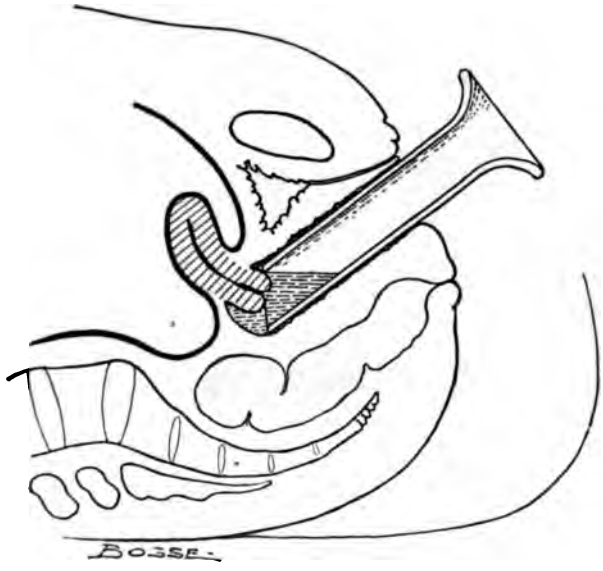

Fig. 38.—Half section showing the Ferguson speculum in place with fluid poured into it. Only that part of the vagina and cervix seen beyond the tip of the speculum is touched by the introduced fluid. Only the cervix can thus be bathed if desired.

A Ferguson speculum introduced into the vagina discloses the cervix, and when gradually drawn out gives a clear picture of the vaginal mucosa. During this manipulation the vagina should be washed and thoroughly dried. One advantage of the Ferguson speculum is that it permits the cervix or the upper part of the vagina to be bathed without touching, if so desired, the lower part of the vagina (Fig. 38). When firmly introduced and pushed into the fornices, fluid is poured into it and the cervix is thoroughly bathed. If the speculum is held firmly, none of the fluid finds its

way between the speculum and the vaginal wall. The fluid is then poured out by depressing the outer end of the speculum and drying the cervix with cotton. If it is desired to bathe the whole vagina, the speculum is gradually drawn out close to the perineum or to the outer end of the vagina, by which manipulation the vaginal wall is stretched, folds are opened out, and every bit of the surface comes in contact with the medicated fluid. During this procedure the outer end of the speculum is lifted up

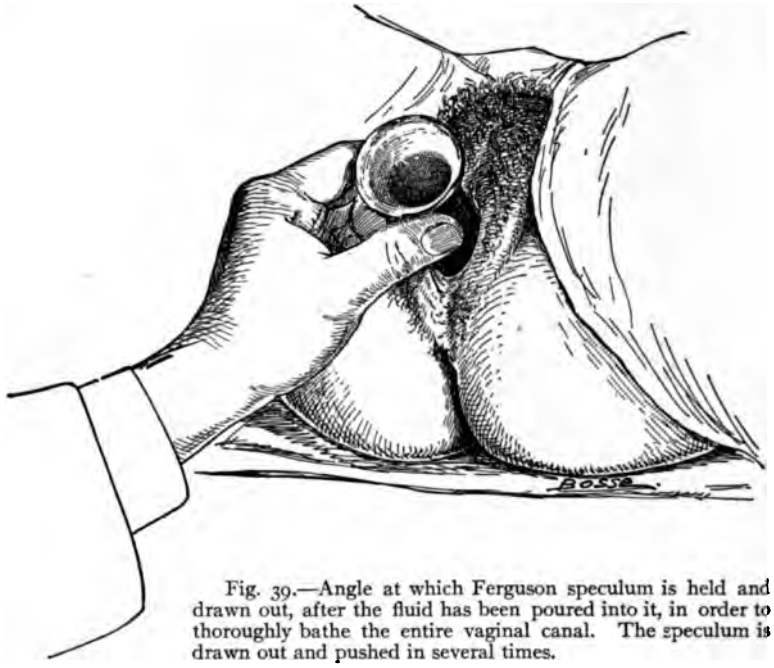

Fig. 39.—Angle at which Ferguson speculum is held and drawn out, after the fluid has been poured into it, in order to thoroughly bathe the entire vaginal canal. The speculum is drawn out and pushed in several times.

so that the speculum is at an angle of 45 degrees to the table (Fig. 39). By depressing the outer end of the speculum, after it has again been pushed up into the fornices, the perineum and anus are kept free from the solution as it runs out of the speculum (Fig. 40).

I have used a Ferguson speculum made of the form and size of the various Kelly cystoscopes, but without the handle, for examining the vagina and portio in infants and children, and for the purpose of giving them vaginal baths with the various silver salts (Fig. 41). The vagina of children is best irrigated by intro-

ducing a rubber urethral catheter, to which is attached the tubing of a fountain syringe or a piston syringe. By this method, if the two halves of the vulva are brought together by the thumb and first finger of the hand, the vagina is distended, the folds are opened out, and a thorough cleansing and medical application is made. The same method of examination and treatment applies in the case of virgins. No injury to the hymen occurs in either case. In the treatment of the vagina of children straight or

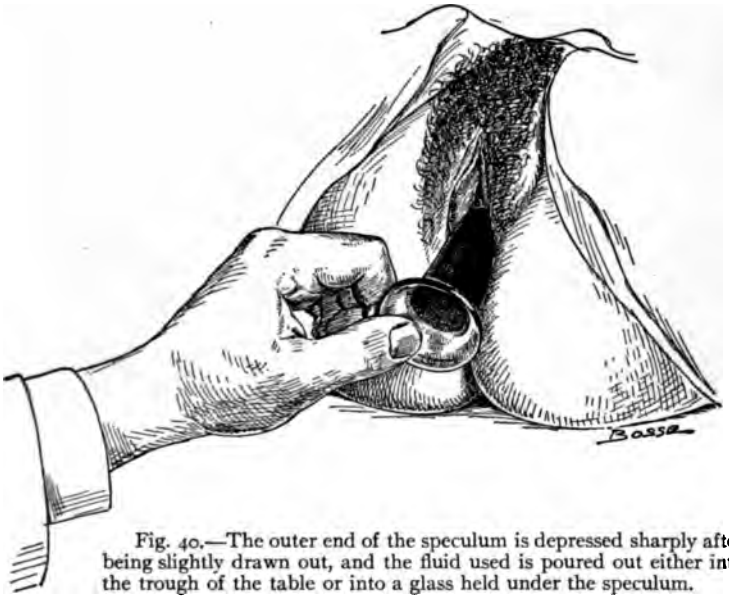

Fig. 40.—The outer end of the speculum is depressed sharply after being slightly drawn out, and the fluid used is poured out either into the trough of the table or into a glass held under the speculum.

curved eye-dropper pipets can be used without injury to the hymen.

The Sims speculum (Fig. 42) is used with the patient lying on her left side in the so-called Sims position. The patient lies on a table or sofa on her left side with the left arm hanging over the left edge of the table and the thorax turned toward the table surface; the knees are bent and flexed sharply and drawn up, the right one higher than the left; the buttocks are near the edge of the lower left corner of the table. The large labia are drawn up by an assistant, and the physician introduces one or two fingers into the vagina up back of the cervix. On this finger or

between these two fingers the proper end of the speculum is introduced, and then turned so that its tip passes toward the hollow of the sacrum. The assistant takes hold of the other end and pulls it backward, pressing on the perineum. Air enters the vagina and bulges it out. The anterior vaginal wall is held back by a depressor, and if a volsellum is introduced and the cervix is grasped by it, an excellent view is obtained of the cervix and fornix.

Fig. 41.—Tiny vaginal Ferguson speculum for use in infants and small children, for the purpose of examination and treatment of the vagina and portio in gonorrheal vulvovaginitis. This procedure is the same as in adults and no harm is done to the hymen. It may be used readily in the urethra of the adult female.

An objection to the Sims speculum is that its use implies assistance; hence, the bivalve is better. In rare cases of retrodisplacement of the uterus it is difficult to get the cervix into view with a bivalve speculum and a Sims speculum in the Sims position is helpful.

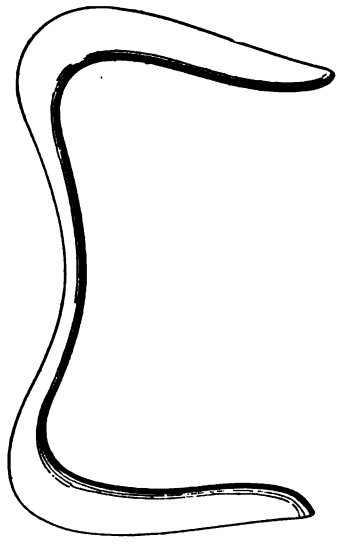

Fig. 42.—Sims speculum. Its use, as a rule, implies the aid of a nurse or an assistant.

Bivalve Speculum.—In introducing the bivalve speculum the labia are held apart by the fingers of the left hand (Fig. 43). The speculum is introduced with the blades closed, the blades looking to the right and to the left. Before introduction the blades should be smeared with vaselin or soapsuds. When introduced in this position, about one-half of their length, they are slowly turned so that the blades look up and down and are parallel to the anterior and posterior walls of the vagina. The outer end of the speculum is then elevated and the inner end is depressed firmly downward so that the tip of the speculum passes back of the cervix into the posterior fornix. The blades are then separated a slight distance, and at the same time the outer end is depressed and drawn slightly outward, so that the upper valve may slip over the

Fig. 44.—Bivalve speculum in place. Through it the cervix is seen, ulcers, erosions, or new-growths of the portio are observed, and the color and character of the cervical discharge are noted. Through the bivalve speculum suction can be exerted with the tube and bulb of Fig. 12, and then cervical and uterine smears for microscopic examination are made. The sound may be introduced, intracervical and intrauterine applications and irrigations can be carried out, intrauterine electrodes can be introduced, scarification of the cervix can be done, test excisions from the cervix and test scrapings from the uterus can be obtained, and vaginal packing with glycerin and gauze or with powders and gauze can be carried out.

tip of the cervix into the anterior fornix. The screw is then turned until the blades are far enough apart to give a good view of the cervix and the fornices (Fig. 44).

Abel's speculum (Fig. 45) is helpful when doing an intrauterine packing, especially in abortion, in order to keep the gauze from contact with the external genitalia and the vulva.

Garrigues' weighted speculum is of aid in doing a curettage,

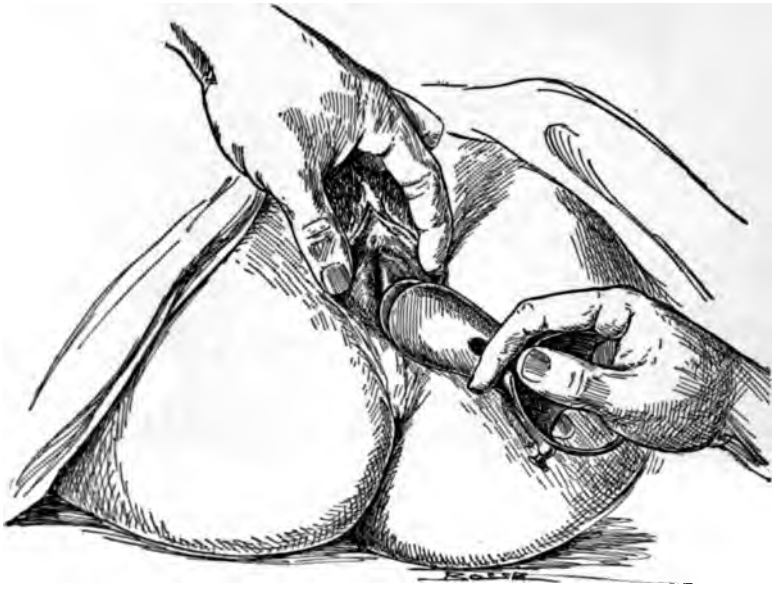

Fig. 43.—In introducing the bivalve speculum the labia are separated by the thumb and index-finger of the left hand; the right hand holds the speculum as indicated. The blades are close together and, covered with soapsuds, are introduced so that the upper edge does not press against the urethra. When introduced as far as the two fingers held on either side of the two blades permit, the speculum is turned so that the blades lie in a horizontal plane. The outer end of the speculum is then elevated so that the tip of the blades passes under the cervix. The blades are then separated.

for no assistance is needed to hold the posterior speculum in place, and the operator holds either the anterior speculum or the volsellum with the left hand. Edebohls' speculum, with a small pail attached, is very serviceable (Fig. 46).

Tampons.—Tampons are made of cotton or wool or wool covered with gauze. A piece of cotton or wool of the desired size is taken and tied with a piece of string. The tampon is then doubled on itself and the free ends are immersed in glycerin,

ichthyol-glycerin, iodoform-glycerin, medicated lanolin, or any other medicament, and passed through the speculum with the aid of a long dressing forceps (Fig. 47) up to or around the cervix. Tampons are used either to apply drugs to the cervix, to apply glycerin for its depleting effect, to support the uterus, or to stretch the posterior fornix, the utero-sacral ligaments, or adhesions in the cul-de-sac of Douglas. Generally one is introduced covered

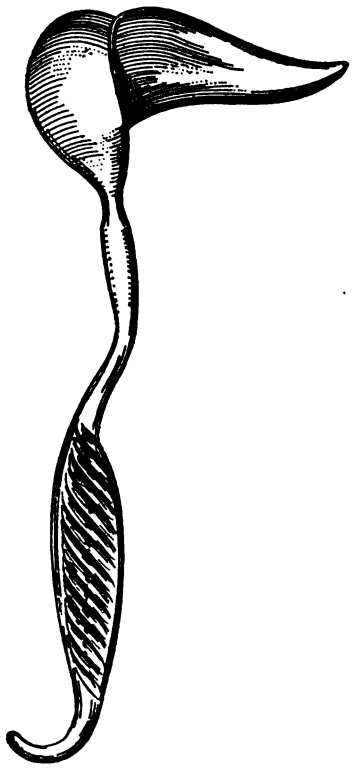

Fig. 45.—Abel's speculum. Its broad lateral flanges completely cover the labia. When packing the cervix and uterus with gauze, it prevents the sterile gauze from coming into contact with any part of the labia or vulva and thus insures perfect asepsis.

Fig. 46.—Edebohls' self-retaining speculum, which is of great service when performing curettage or intrauterine packing without assistance. The pail, partly filled with water, serves as the weight to keep the speculum in place and catches the fluids and scrapings.

with medicated glycerin and a dry one is introduced after to keep it in place. Two, three, or four of such small tampons may be introduced into the posterior fornix and anterior fornix, and then kept in place by a large one introduced after them or by gauze packed into the vagina. The strings about the tampon are made long

enough to extend out of the introitus so that they may be removed at the end of twelve or twenty-four hours.

Wool tampons are more elastic and give better support to the

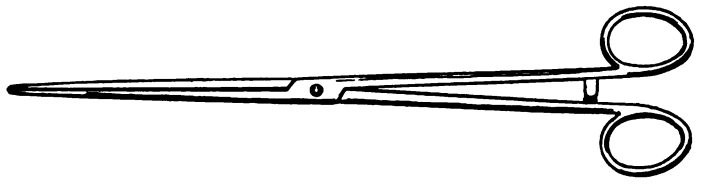

Fig. 47.—Dressing forceps of proper caliber and curve. It is used in any and all of the procedures implied in the treatment of the cervix and vagina with the aid of the bivalve or Ferguson specula. It is also to be introduced into the uterus when packing it with gauze.

uterus if this is the desired purpose. One or more of such tampons covered with the desired medicament may be used, or one long strip, with a string tied about it, may be used of a size sufficient to be packed in the fornices and to fill the vagina. This wool is often irritating, but when its use is desired it may be covered with gauze.

Instead of using several tampons, each separately tied by a string, we may use two, three, or more tampons, attached to each other at various distances by thread or string and packed in one after the other. They are easily removed by pulling on the string of the last one.

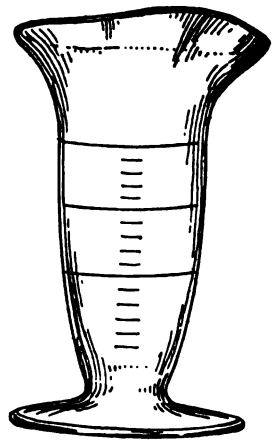

Fig. 48.—Measuring glass used in pouring glycerin into the bivalve speculum and in pouring any desired solution into the Ferguson speculum.

In most cases I have discarded the use of cotton or wool and use gauze instead; soft gauze in strips 6 or more inches wide and of any desired length meets the requirements. The desired glycerin mixture is poured into the speculum (Fig. 48) and one long strip of gauze is packed gently or firmly into the lateral and posterior fornices and the unused end is allowed to hang out over the posterior wall of the speculum. Another strip, somewhat shorter, is then packed into the anterior fornix (Fig. 49). Then the two unused

portions are gently but firmly introduced together into the upper part of the vagina, and loosely into the lower half of the vagina. This packing is held in place by pressure with dressing forceps and the speculum is removed. The advantage of this is firmer support to the uterus, excellent stretching effect on sclerosed bands in the posterior fornix and on the cul-de-sac of Douglas, and good drainage of the serous effusion produced by the glycerin.

Tampons introduced into the vagina are generally applied about the cervix and in the fornices to permit of medication of the cervix and its canal and to exert a depleting or dehydrating action on the pelvic organs. Tampons for the treatment of the vagina itself

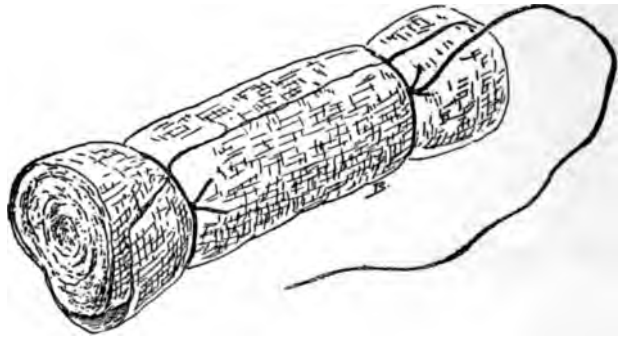

Fig. 50.—Long vaginal tampon, made of cotton covered with sterile gauze, to be introduced into the vagina through the bivalve or, better, through the Ferguson speculum. This tampon when dusted with powder is of great aid in applying any desired dry medicament to the vaginal walls and in keeping them dry.

consist of cotton rolled to any desired diameter and cut off to a length a little less than the length of the vagina. This is then covered by two or three layers of gauze and a string is tied about either end to keep the gauze in place. The string at one end is left long enough to permit this tampon to be pulled out (Fig. 50). If such a tampon be dusted with various powders and introduced into the vagina, preferably through a Ferguson speculum, it brings the drug in constant contact with the vaginal mucosa and keeps the vaginal mucosa dry.

The vagina may be packed throughout its whole length with bichlorid gauze, with iodoform gauze, or with gauze soaked in any of the silver salts, in astringent solutions, or any desired

Fig. 40.—Introducing gauze, with dressing forceps, into the fornices of the vagina and into the vaginal canal. The posterior fornix is especially well packed with a long strip of gauze. Then the anterior fornix is packed with another strip. Then the upper and middle thirds of the vagina are gently but firmly packed with the unused halves of the two long strips. The screw which opens the blades of the speculum is then loosened entirely. The dressing forceps press the gauze upward as the speculum is being drawn. The speculum is gradually rotated so that the blades lie against the lateral walls of the vagina. Thus pressure against the urethra and rectum by the separated blades is avoided on removing the bivalve.

medicament. Powders may be blown into the vagina through any of the specula (Fig. 51).

Volsella, or tenaculum forceps, are used to grasp the anterior or posterior lips of the cervix (Fig. 52). If one is applied to either lip, it brings the lacerated cervix into a position where we may judge whether the red irritated area is a part of the cervical canal or whether it is external to the cervical canal and so constitutes an erosion.

The volsella is also occasionally used to grasp the cervix to steady it for the introduction of the sound. By pulling on the volsella the cervix is drawn down and the fundus is pulled back if in anteflexion or forward if in retroflexion, and into a uterus thus straightened out the sound may be more readily introduced.

This instrument is also used to steady the cervix and to lift

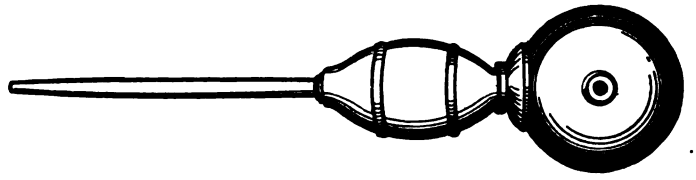

Fig. 51.—Powder-blower, for blowing any desired powders into the vagina, which is best done through the Ferguson speculum. As the speculum is slowly drawn out, every bit of the exposed cervix and vaginal walls is covered with powder in succession.

it up to permit of the introduction of gauze or Playfair sounds or medicated pencils into the uterus and to permit a more thorough packing of the posterior fornix with gauze.

It is of value in pulling down the cervix, when making a bimanual examination, to determine the relation of the uterus to a pelvic tumor which may belong to the uterus or to the ovary, or which may be of an extrauterine nature.

Tugging on the cervix by a volsella is contraindicated in all inflammatory conditions of the adnexa, with peritoneal adhesions and with gonorrhea.

Scarification.—The withdrawal of blood from the cervix and uterus by scarification is sometimes indicated in cases of chronic fibrosis and congestion of the uterus and in cases where the preliminary uterine and pelvic congestion, when associated with a

delay in the outflow of the blood, causes intense and excruciating pain and colic which lasts until the outflow of blood is established.

Scarification may be done with the aid of the bivalve or Ferguson speculum, the vagina and cervix being thoroughly cleansed. Two or three stabs may be made with the scarificator to a depth of 1 cm. Blood up to the amount of one ounce may be withdrawn

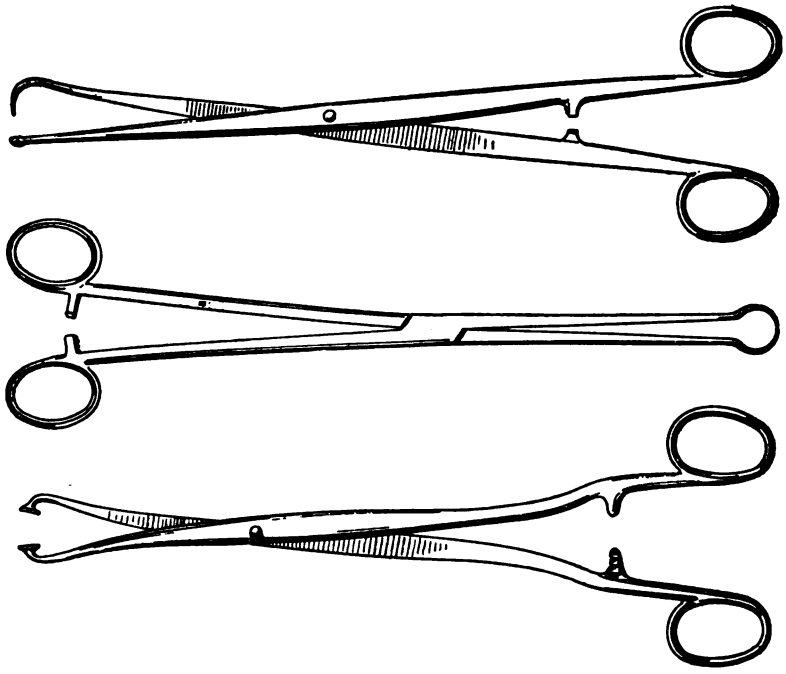

Fig. 52.—Tenaculum forceps of various forms, for grasping the cervix, holding it firmly and pulling it down while performing any intrauterine manipulation or packing the posterior fornix or while making a bimanual examination. In a bimanual examination it is sometimes of aid to pull the uterus down by a volsella and determine its relation to a pelvic tumor.

from patients who are not anemic. Then a tampon soaked in iodoform-glycerin or tannin-glycerin should be introduced, or, better still, the upper part of the vagina should be thoroughly packed with iodoform gauze.

INTRAUTERINE THERAPY

Intrauterine therapy is practised by some, with the use of cotton rolled in a thin layer on very thin metal applicators; by others

drugs are introduced into the uterine cavity by the Braun intrauterine syringe (Figs. 53 and 54); and by others the Braun intrauterine syringe is used, covered with cotton, as in the case of the intrauterine applicator.

In making intrauterine injections with a syringe, contraction of the uterus may cause uterine colic or may force the fluid into the tubes. The cervix, and especially the internal os, must be

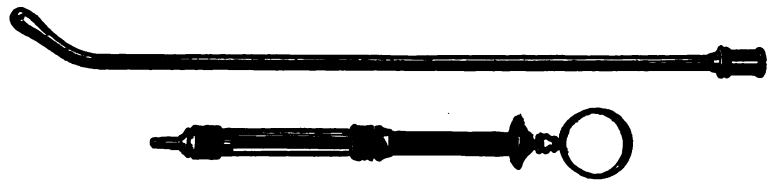

Fig. 53.—Braun intrauterine syringe, for injecting fluids into the uterus. When the tip is covered by a layer of cotton, firmly applied, the drug is injected after the tip is introduced into the uterus. The cotton becomes impregnated with the solution and is evenly applied to the mucosa. No free fluid enters the uterine cavity and contractions of the uterus cannot force any fluid into the tubes. The cervical canal must be well dilated before using this syringe. The same procedure is applicable to the urethra.

wide enough to permit of thorough drainage. Hence, in order to avoid contraction of the uterus and the forcing of fluid into the tubes, it is wiser to use Playfair or other applicators covered with cotton and dipped in the desired medicament (Fig. 55). These cotton-covered applicators are allowed to remain in the uterus for a few seconds. If, however, the internal os is not sufficiently wide,

Fig. 54.—A modification of the Braun intrauterine syringe, with numerous lateral openings at the tip of the cannula. (It can be used in the same manner in the urethra.)

and if the applicator is not quickly introduced, very little of the drug comes into contact with the uterine lining. Hence, it is better if this method of treatment is desired, to use the Braun syringe covered with cotton, the drug being injected only after the syringe tip has been introduced into the uterus. The fluid simply moistens the cotton and the desired end is attained without danger (Fig. 56).

The uterus may be treated by introducing into its cavity medi-

cated pencils containing the various drugs in a base of cacao-butter, etc.

Intrauterine applications should rarely be carried out in office practice, and if this is to be done they must be preceded by thorough dilatation of the cervix. This may be done by incising the cervix

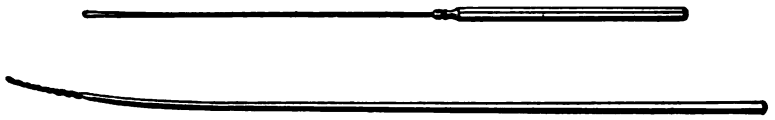

Fig. 55.—Applicators which, when covered with a layer of cotton, and dipped into various solutions, are used for making intrauterine applications. When covered with a layer of cotton and dipped into sterile vaselin or lysol solution they are used to gradually and slowly dilate the cervical canal.

laterally, up to the internal os, and beginning with intrauterine treatment when the incisions are healed. The cervix may be gradually dilated by applicators covered with cotton soaked in lysol or covered with sterile vaselin and introduced in increasing size, after which a thin wick of iodoform gauze is introduced into

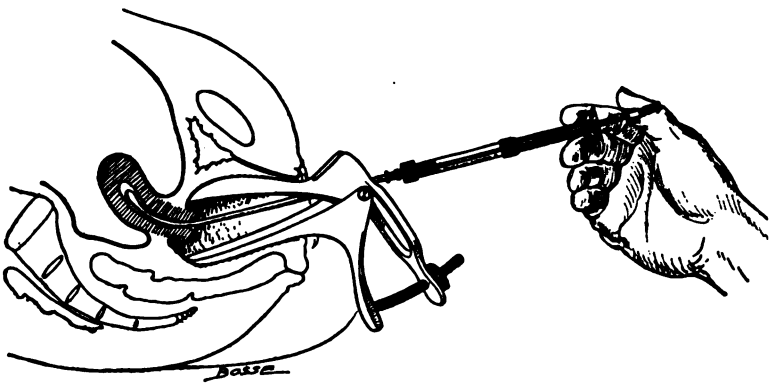

Fig. 56.—Half section showing the method of using the Braun intrauterine syringe.

the cervix and allowed to remain in place for twenty-four hours, being kept in place by vaginal packing. Several treatments of this nature are enough to dilate the cervix sufficiently to permit of intrauterine applications.

Another method of dilating the cervix is by the use of sterilized tupelo or other tents kept in place for twenty-four hours. Their

action in dilating a cervix is certainly excellent, but they often produce extreme pain, so that their use in ambulatory practice is not feasible, nor is it advisable.

The best method, *if dilatation must be done* in the office, is to use the smallest size of uterine sound, then a larger size, leaving each in place for a minute. We then continue with Weir's sounds bent to the proper curve, using them in succession up to the desired size.

These methods of dilating the cervix, to permit of intrauterine therapy, have little to recommend them. They are dangerous if intrauterine therapy is desired for inflammatory conditions of the uterus, inflammatory endometritis, uterine leukorrhea, etc. We are then dealing with a cervix and a uterus containing micro-organisms, and the risk of causing a pericervical inflammation or

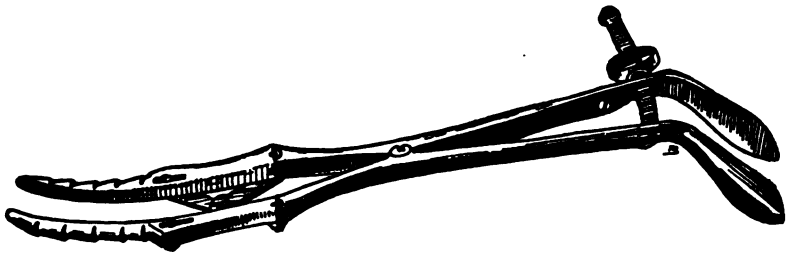

Fig. 57.—Goodell's glove-stretcher dilator, for dilating the cervix. This must be used gently, with constant relaxation and rotation of the blades. When used vigorously or allowed to slip out while the blades are being separated, it may cause deep recognized or unrecognized tears into the cervical wall and into the broad ligament.

lighting up an extension of an intrauterine inflammation is certainly present.

The method of dilating the cervix by sounds or by applicators wrapped in cotton and dipped in antiseptic solutions or in sterile vaselin, or the introduction of stem pessaries into the cervix, is perhaps justified in making the diagnosis of cervical stenosis or obstruction as the cause of dysmenorrhea, and in overcoming such obstruction when it is considered the cause of dysmenorrhea or sterility. It should then be done with the greatest care, and only when intrauterine and intracervical infection of any form can be absolutely excluded.

Dilatation of the cervix under anesthesia by dilators of the glove-stretcher variety (Fig. 57) or, better still, by the graduated Hegar dilators dipped in lysol or sterile vaselin is a necessary preliminary to

curettage (Fig. 58). It is also the only proper procedure as a preliminary step in the hands of those who wish to treat intrauterine leukorrhea or intrauterine gonorrhea by intrauterine irrigation or by packings with protargol or silver salts, or by irrigation plus curettage followed by packing with silver salts. While the value of curettage and intrauterine packing in the treatment of uterine gonorrhea is a matter to be settled by the future, it at least does

Fig. 58.—Hegar graduated dilators, for dilating the cervix without the associated risk of tearing the cervix. They produce an even dilation. In five to ten minutes the cervix can be dilated sufficiently to admit the index or middle finger.

away with continued irritation and tinkering with an infected cervix, which procedure is not infrequently the cause of varying degrees of pelvic inflammation. Medicated bougies containing iodoform or silver salts or ichthyol, etc., are used by some for treating inflammatory conditions of the cervix and uterus.

Intrauterine Irrigation.—In performing intrauterine irrigation a double-running catheter of metal should be used. The

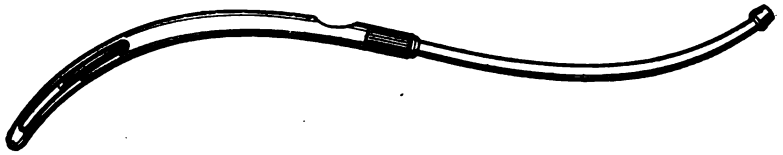

Fig. 59.—Fritsch-Bozeman double-running intrauterine irrigator. It is of various calibers. Fluid should be allowed to run out of it before it is introduced into the uterus. The cervix must first be dilated. The uterus is irrigated before and after curettage.

anterior half of the **Fritsch-Bozeman** irrigator (the safest) consists of an outer tube with an opening on the under surface of its lower end. The tip of the tube is solid, but one-half inch from its tip there is on either side a fenestra two inches long. Within this outer tube there is a much smaller tube, which by no means fills the lumen, and which extends almost to the end of the outer tube

(Fig. 59). The fluid runs in through the inner tube and enters the uterus through the lateral fenestræ at the anterior end of the outer tube. The fluid re-enters these fenestræ and enters the lumen of the outer tube and is poured out through the opening on the under surface of the lower end of the outer tube. By moving the tip of the intrauterine irrigator up and down, all parts of the uterine cavity are thoroughly irrigated, and no intrauterine pressure by the injected fluid is exerted so long as the opening on the under surface of the anterior half remains outside of the cervix. With this instrument, of a sufficiently small caliber and of the proper curve, the average uterus may be irrigated with small amounts or large amounts (reaching up into the quarts) of any desired fluid. Naturally enough, this procedure implies a preliminary dilatation of the cervical canal, not alone to permit of the introduction of this irrigator, but also to permit of ready drainage of the uterus. Such

Fig. 60.—Small-calibered double-running intrauterine irrigator, for irrigating the uterus in office practice (a procedure requiring the greatest care). It is practically a modification of the Fritsch irrigator.

an intrauterine irrigation is done before and after curettage of the uterus. In office practice an intrauterine double-running irrigator of small caliber and of the form of Fig. 60 is very useful.

Curet.—The curet finds a legitimate field for use in the removal from the uterine cavity of foreign substances, such as placenta, or placental remnants, and in the removal of overgrowths of the endometrium in the form of polyps or hyperplastic endometrium, or overgrown endometrium left behind as decidua after abortion in the early stages (Figs. 61 and 62). The symptoms of these conditions are bleedings, generally of the form of menorrhagia, and, in the case of polyps, not infrequently of the form of metrorrhagia. Associated with this condition of retention of decidua or placental elements, or with the condition of "hyperplastic endometritis," is an involvement of the uterine wall. As can be seen from the etiology, the uterus is often large, sometimes soft, sometimes hard, it is congested, it is subinvoluted. Its contractility is altered,

and a state of atony often exists. Hence the condition of the uterine wall plays an important part in the production of menorrhagia. Curettage not only removes the abnormal endometrium, but by its physical stimulus and by the loss of blood rouses the uterus to contraction. A curettage, followed as it should be by a hot intrauterine irrigation, with a double-running irrigator, of lysol 0.5 to 1 per cent., etc., produces, as can be seen by measuring

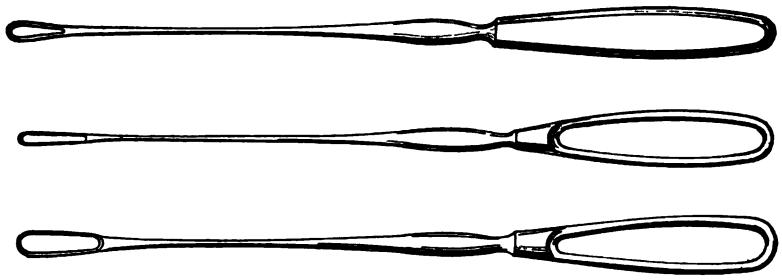

Fig. 61.—Three sharp curets.

the uterus with a sound, further marked diminution in the size of the uterus. The subsequent introduction into the uterine cavity of a wick of iodoform gauze, plus the administration of ergotol for several days, brings about further involution of the uterine wall. In those cases in which the uterus is quite large and quite flabby, especially if the cavity of the uterus is large, and the walls thin and atonic, atmocausis, carried out for half a minute to a minute after the curetting, has a splendid action in

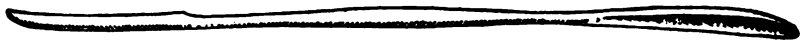

Fig. 62.—Martin's curet, which is useful in taking out the ring of adenoid tissue so often present at the internal os.

contracting the uterus, and in promoting a serous exudation which greatly aids the subsequent involution of the uterus.

Curettage for hyperplastic endometrium is followed, in the hands of many men, by routine applications to the uterine cavity. Perchlorid of iron, carbolic acid, tincture of iodin, tincture of iodin and carbolic acid, chromic acid 5 to 10 per cent., chlorid of zinc 5 to 10 per cent., 50 per cent. carbolic acid in alcohol, ichthyol 10 to 20 per cent. or stronger, etc., are used as more or less routine

procedures. Unless a curetting is too energetically done, or unless the subsequent applications exert too deep a caustic action and thereby cause atrophy of the uterus or obliteration of the uterine cavity, the majority of cases of hyperplastic endometrium treated by this method are much improved or cured, so long as a hyperplastic endometrium is really present.

Frequently, where this condition is diagnosed, there is no hypertrophic endometrium. The uterus is soft and flabby, the walls are atonic, and curetting is of no value. Such cases need the internal administration of ergot, the use of bimanual massage of the uterus, and douches which increase the uterine tone. Hot vaginal douches are of importance in promoting contraction of the uterus. Frequently, where a hyperplastic condition is diagnosed, the curet scrapes away very little mucosa, the uterus is hard, the curet feels the hard fibrotic walls. We are here dealing with alterations of a permanent nature, involving the uterine muscle, its connective tissue and vessels. These are the cases in which atmocausis carried out for a period of two to five minutes sometimes causes marked improvement, but ofttimes only a temporary one, so that hysterectomy is often necessary.

In the treatment of true inflammatory endometritis, of the chronic form, there is great difference of opinion as to the use of the curet. Some advise against its use, while others report excellent results. Although periuterine or adnexal involvements constitute a contraindication, yet the curet is used by some even in cases complicated by old inflammatory involvements about the uterus. In the case of gonorrhea of the uterus only, Boldt and many others advise curettage followed by intrauterine applications or by intrauterine packings soaked in germicidal solutions, usually the silver salts. It must be remembered that gonorrhea involving the uterus is a disease the extent of which cannot be accurately gaged. In many cases the condition is a superficial one, as Bumm believes it to be in the vast majority of instances. The reaction of individuals to the inroads of the gonococcus is most variable. In some the disease produces marked rapid extension and deep subepithelial involvement, the activity of the process continuing for months and years. In others the condition is not extensive nor is the involvement deep, and these patients seem

relatively immune, in the sense that they more or less readily overcome the infection and the gonococci disappear. In considering the treatment of intrauterine gonorrhea, we may divide the cases into three classes: (1) That form associated with pyosalpinx; (2) a form associated with mild salpingo-oöphoritis, of which sterility is often the only symptom. (3) The third class is that in which neither subjectively nor objectively can involvement of the adnexa be determined. It is difficult to see the value of curettage in the first class of cases, and the dangers associated with the use of the curet in the presence of pyosalpinx are not to be underestimated. In the second class, where marked peritoneal involvement is often absent, the danger of lighting up a recrudescence is certainly great. In the third class, where we presuppose no disease of the tubes, ovaries, or peritoneum, why take the chance of producing such a disease, with the resulting consequences of sterility and pain? In those cases in which the condition is limited to the uterus, and is superficial, there is a relative immunity on the part of the patient, and conservative treatment aids the natural resistance of the patient in ridding the mucosa of the superficial changes. At best this condition is no bar to pregnancy, for this takes place in many cases. Care and conservative treatment have not infrequently resulted in pregnancy even when a gonorrhea has involved the tubes, ovaries, and peritoneum. There are cases of intrauterine gonorrhea in which no intrauterine therapy will rid this organ of its specific diplococci. The experience of Bumm shows that even his method not rarely results in a disappearance of the gonococci, only to be followed subsequently by their reappearance. The annoyances which patients suffer as a result of localized intrauterine gonorrhea are not sufficient of themselves to justify the use of the curet, and if associated lesions of the tube, ovary, and peritoneum are the factors which bring the patient to us for help, in my opinion curettage is certainly not indicated then.

In the treatment of uterine conditions of uncertain etiology associated with pathologic discharge, we must recognize some as due to gonococci, but without the microscopic evidences of their presence; we may consider some of them as originally gonorrheal, and eventually chronic, as a result of structural changes and the

presence perhaps of other bacteria and cocci. Some we may consider as originally due to other bacteria than the gonococci. This is an all-important question. Either there once existed a mild or severe inflammatory endometritis after abortion or labor, which persists in subacute chronic form, or else there has occurred, in a uterus congested and hyperemic, an invasion of non-specific bacteria which produce and keep up a more or less constant intrauterine discharge. It is often impossible to distinguish such cases from the forms of hypersecretion existing in uteri subjected to the alterations of subinvolution and the hypersecretion associated with chlorosis and anemia, or associated with the congested uteri of fat women, many of whom are multiparæ.

In these various forms the curet in the hands of many is used because of the uterine leukorrhea, and often, as reports go, with very satisfactory results. By others intrauterine applications without curettage are applied: chromic acid, 5 per cent.; perchlorid of iron, 5 per cent.; sulphate of zinc, 5 to 10 per cent.; chlorid of zinc, 5 to 10 per cent.; carbolic acid and alcohol, equal parts; ichthyol, 10 to 20 per cent.; tincture of iodin, 50 per cent.; nitrate of silver, 5 per cent., etc. I never use the curet for uterine leukorrhea alone.

It is in this class of cases, if the annoyances justify its use, that intrauterine irrigations are applicable. The solutions used with the aid of the double-running irrigator are numerous.

In this class of cases the safest and most conservative treatment is the use of prolonged cold water vaginal douches.

Much is considered, however, under endometritis which has nothing to do with inflammation of the endometrium.

Leukorrhea in anemic and chlorotic girls is originally due to anemia of the mucosa, and to subsequent serous transudation on the part of the hydremic blood. On this basis, of course, there occurs more readily an inflammatory endometritis.

Isolated inflammation of the cervix mucosa is to be treated by drugs. Vaginal douches are of value, when cool, in the acute stage, and hot in the chronic stage. Mud baths and carbonated saline baths are important. When the portio is hyperemic, in addition to the bath treatment Glauber's salts are of value. If hyperemia persists, we use cool douches of 70° to 55°. Scarification followed

by suction can be carried out. The treatment of erosions is by medicaments.

Curettage.—In the performance of curettage all the aseptic precautions of a major operation should be observed. The vulva should be shaved and thoroughly disinfected, and the vagina should be scrubbed with green soap with the aid of a gauze sponge on a sponge-holder, followed by a thorough scrubbing with 0.5 to 1 per cent. lysol solution.

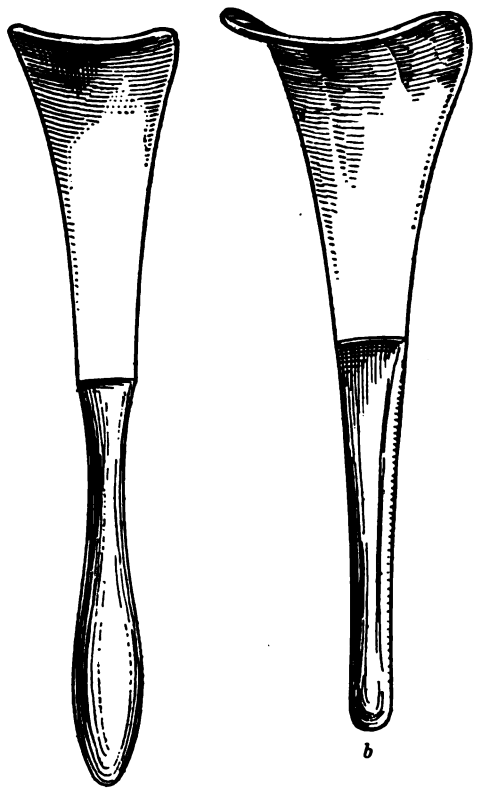

Fig. 63.—*a*, Anterior vaginal retractor; *b*, posterior vaginal retractor.

The patient is in the lithotomy position on a Kelly pad. The entire vulvar area is covered with a sterile sheet, with the exception of an opening large enough to permit of the required manipulations. A towel or the lower margin of the perforation in the sheet should be fastened by a suture to the perineum so that the anus is entirely out of the field. A Garrigues weighted speculum, which is self-retaining, or an Edebohls speculum to which is attached a small pail to catch the fluids, and which is likewise self-retaining, may be used.

With proper assistance, however, a broad flat speculum is better, and should be held in place by an assistant. An anterior speculum is introduced so that the cervix is brought

into view, and the anterior lip of the cervix is then grasped firmly with a volsella. The cervix is dried and a sound is introduced to measure the length and position of the uterus. The cervix must then be thoroughly dilated. This may be done with the glove-stretcher dilator, or, better still, with Hegar graduated dilators, which are dipped into a lysol solution or into sterile vaselin. With the latter dilators, if time is taken, a very thorough dilatation of the cervix is obtained without breaking the tissues, and the danger of tearing through the cervix into one or the other of the broad ligaments is obviated. This danger is always present when using a glove-stretcher dilator hastily with a rigid cervix.

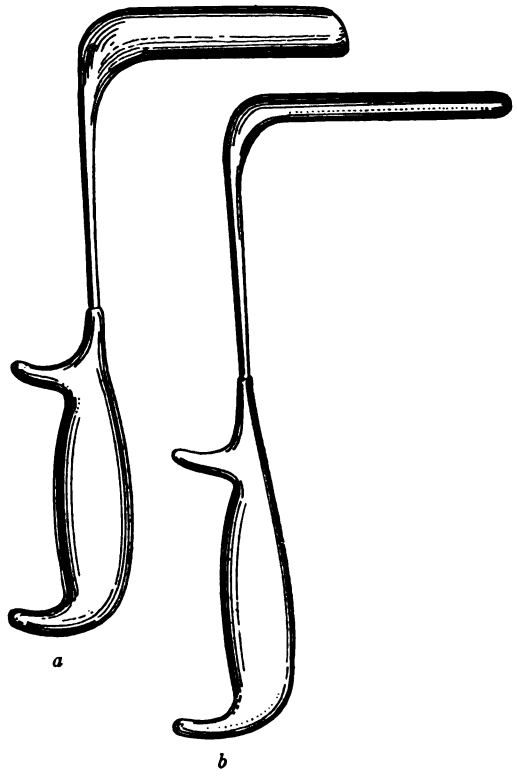

Fig. 64.—*a*, Wide vaginal speculum; *b*, narrow vaginal speculum and retractor.

Figs. 63 to 66 show flat vaginal specula, of various lengths and breadths, to be used as anterior and posterior retractors in manipulations or operations on the cervix and uterus. They are of great aid in performing vaginal celiotomy.

After thorough dilatation of the cervix the uterus is irrigated with a 0.5 per cent. solution of lysol (Fig. 67). A small sized curet is taken and the index-finger of the right hand is placed at a distance from the tip which corresponds to the length of the uterus as

measured by the sound. If the finger be held at this point during the performance of curettage, the danger of perforating the uterus is out of the question (Fig. 68). The inner surface of the uterus is then curetted by gentle but firm movements from above downward, passing around the entire interior of the uterus in succession. This manipulation is repeated two or three times, particular at-

Fig. 65.—Simon's posterior vaginal speculum.

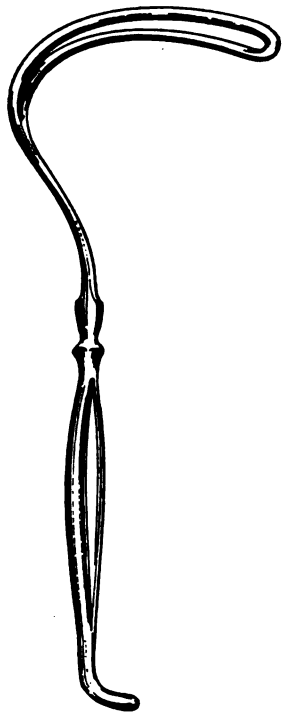

Fig. 66.—Anterior vaginal retractor.

tention being paid to the lateral borders of the uterine cavity and to the region of the uterine cornua.

When the curet has removed the superfluous tissues and sufficient of the endometrium, its contact with the uterine wall causes a feeling of resistance and produces a hard, gristly sound. The uterus is then again irrigated with a double-running catheter, 0.5 to 1 per cent. lysol solution being used.

A smaller curet is again introduced and the surface is gone over again gently and the uterus once more irrigated; a twisted wick of iodoform gauze is then introduced into the uterus by the intrauterine packer and withdrawn so that the uterus is freed of the retained fluid or blood. A fresh twisted strip of iodoform gauze is then packed again into the uterus, and especially into the cervix, and an end long enough to reach beyond the vulva is held outside

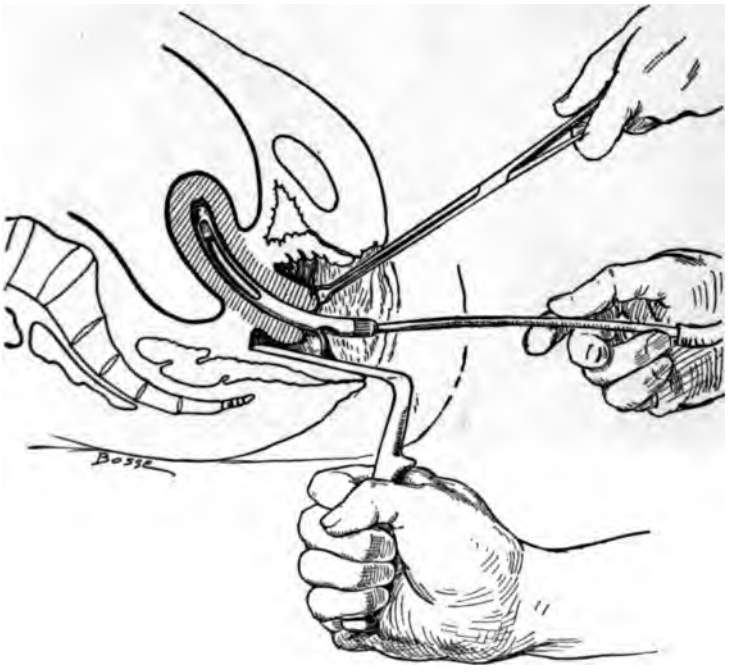

Fig. 67.—Half section, Fritsch intrauterine double-running irrigator in place. So long as the opening on the under surface is outside of the cervix no great intrauterine pressure by fluid can be exerted.

the vulva (Fig. 69). The volsella which grasps the cervix is taken off and a wide strip of iodoform gauze is then packed thoroughly into the fornices and in the vagina, passing in circular fashion about this intrauterine strip. The speculum is then removed and a knot is tied in the intrauterine strip so that it may be recognized and removed after twenty-four, forty-eight, or seventy-two hours without disturbing the vaginal packing.

So soon as possible ergot, or better ergotol (15 minims), is

administered every three hours for several days, even after the removal of the intrauterine strip.

The vaginal packing is removed after three or four days, and short hot vaginal douches containing lysol 0.5 per cent., or carbolic acid 1 per cent., or bichlorid of mercury 1: 5000, are given.

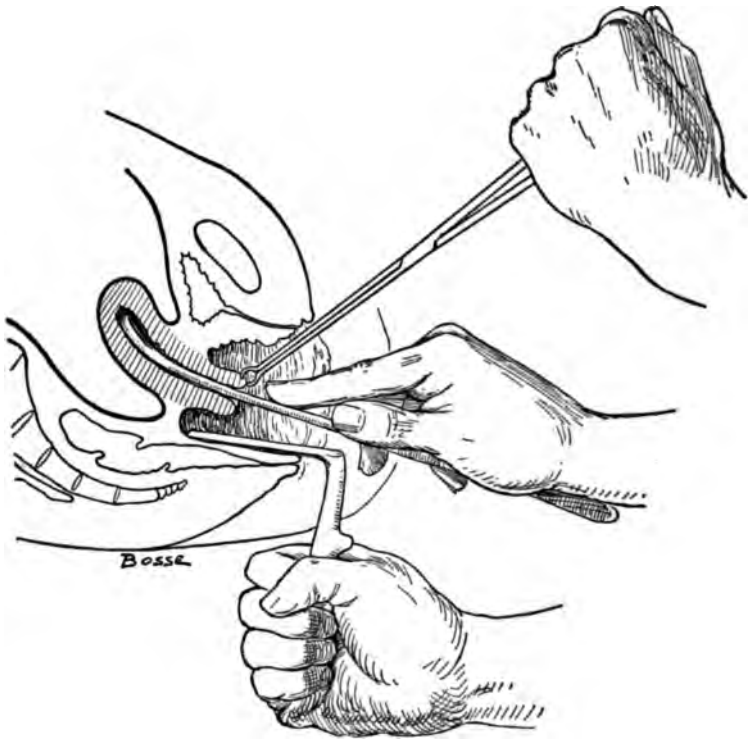

Fig. 68.—Half section of the pelvis, showing posterior retractor and volsella in place with the curet in the uterus and the finger held on the curet to avoid danger of perforation. In curettage the index-finger of the right hand, when placed at a measured point on the curet, and held there during the curetting, avoids the danger of entering so deeply with this instrument as to perforate a uterus. The length of the uterine canal is first measured with a sound, most gently introduced, and the finger is placed on the curet at the corresponding point.

The operation of simple curettage can be very well performed with the aid of nitrous oxid anesthesia. If curettage is done for incomplete abortion in the very early weeks, this method suffices, very great care being necessary to use a medium-sized curet with the gentlest of manipulations. The size of the uterus must be determined by bimanual examination and by the use of the sound.

In progressing abortion in the third or fourth months with the retention of the ovum, if the cervix is very well dilated the uterine contents may often be removed by the careful use of the placental forceps (Fig. 70). If the cervix is not well dilated, it may be stretched either by the glove-stretcher dilator, or, better still, by the use of the Hegar dilators. On the other hand, it is wise, unless

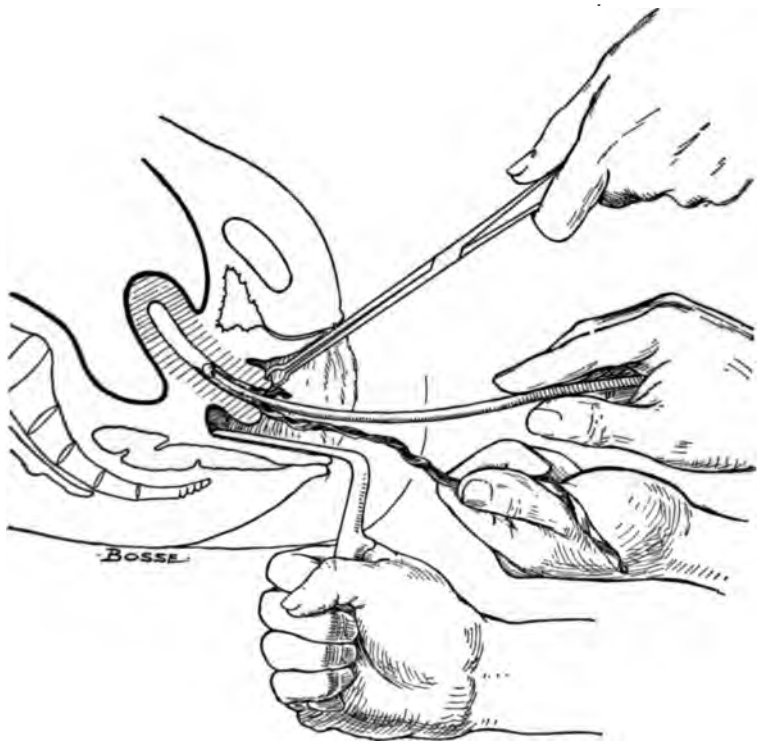

Fig. 69.—A wick of iodoform gauze is introduced into the uterus by the dressing forceps or, better still, by a packer which is of the caliber of a sound and which has a serrated tip so that the end of the gauze, when placed on it, does not slip off.

the surroundings and conditions prevent, to dilate the cervix in most of these cases by packing the uterus, and especially the cervix, under strictest aseptic precautions, with iodoform gauze, and then packing the fornices and vagina to the introitus vaginæ with a wide strip of iodoform gauze. This method of painless dilatation of the cervix has the advantage that no injury is done to the friable cervical tissues.

It happens often enough that the retained ovum is found readily by the placental forceps after this method of dilatation, especially if during the time in which the gauze has been in place (twenty-four to forty-eight hours) ergot or ergotol is administered. The administration of ergot causes contraction of the uterus, and, the exit of blood being prevented by the gauze, the ovum is loosened from contact with the uterine wall. After removing the gauze the placental forceps may grasp the ovum and remove it *in toto*, even without the use of anesthesia. Careful curettage with a blunt curet (Fig. 71) completes the operation and is followed by an intrauterine irrigation with very hot lysol (0.5 per cent.); temperature, 115° F. If the uterus does not contract well, 4 ounces of dilute acetic acid to the quart of hot water is used as an intrauterine irrigation. The uterus is then packed with iodoform gauze and so is the vagina.

Fig. 70.—Placental forceps, to be introduced into the uterus to grasp an ovum, or fetal sac or retained products of conception which are lying in the uterine cavity. If it is desired to remove placental tissue in contact with the uterine wall, the location of this tissue should be first determined by introducing the middle finger into the uterus. One blade of the placental forceps serves well as a dull curet.

Fig. 71.—Dull curet, for removing placental tissue in contact with the uterine wall and for removing decidual tissue by very gentle curettage.

Curage in Abortion in Third and Fourth Months.—If the placental forceps do not grasp a loosened ovum, the middle finger, under the strictest aseptic precautions, is introduced into the cervix and uterus; the other hand, pressing

through the abdominal wall, pushes the uterus down into the pelvis, and pressing on the fundus brings it in contact with the internal finger. In this way the middle finger of the internal hand can palpate the entire uterine cavity, can separate the whole ovum or the adherent parts, or remove whatever of fetal sac or placenta is attached (Fig. 72). After this procedure the placental forceps carefully introduced can extract whatever loosened contents are in the uterus. The uterus should then receive a very hot douche, with a double-running

Fig. 72.—Half section, showing the introduction of the middle finger into the uterus and the pressing down of the fundus uteri by the external fingers. By this combined manipulation an ovum can be completely loosened from connection with the uterine wall and adherent placental tissue can be scraped off. This method, known as "curage," is a sure, safe procedure and obviates the danger of perforation or of leaving behind unrecognized fetal products. The cervix must be well dilated.

irrigator, of 1 per cent. lysol. If the finger has been unable to separate part of the placental tissues, their location at least is noted, and placental forceps or a large blunt curet are then introduced for their removal. The uterus is then packed with iodoform gauze and ergot is administered. The vagina is also packed with iodoform gauze. The gauze is removed in from twenty-four to forty-eight hours and the ergot is continued. In incomplete abortion it is rarely necessary to use the sharp curet unless, in very early cases, the uterus is so small that the finger method, or curage, cannot be

used. The use of the sharp curet alone is a dangerous thing in abortion in the third and fourth months: First, we are never sure that we have removed all the products of conception; second, perforation of the uterus occurs very readily. During the manipulation of the curet the uterus dilates and contracts easily, as it does in the post-partum period at full term, and if the curet is held very firmly, simple contraction of the uterus is enough to cause perforation by this instrument, even if dull.

It is by no means infrequent to find in abortions at the tenth or twelfth week, when an embryo is spontaneously expelled, that decidua, the sac of the ovum, or placental remnants are retained. These, as a rule, prevent the uterus from returning to normal size, the cervix does not contract, and there is generally a steady or irregular loss of blood. Under these circumstances the method of slow dilatation of the cervix by packing it and the vagina with iodoform gauze for twenty-four hours, and of examination and cleansing of cavity with the finger, is advisable. If this procedure is not possible, or if the finger finds no retained fetal tissues, the dull curet should be used with the greatest of precaution. In using any curet in the uterus, it is my custom to first measure the length of the uterine cavity with a sound and then to place the index-finger of the right hand on the curet at a point which makes the distance from the tip of the curet to the finger a little less than the length of the uterine canal, as measured by the sound. Curettage is then done, with the finger held firmly on this point, so that the instrument at no time enters further into the uterus than the measured length. The above described method of painless, slow dilatation of the cervix by the use of iodoform gauze is the safest and wisest procedure. The above method of removing the contents of the uterus by the introduced finger is surest and safest. The finger recognizes adherent tissues. It locates any tissue that cannot be scraped off; it cannot perforate the uterus. It makes the diagnosis and carries out the treatment. It should be used in every case in which the uterus is three times the normal size.

Atmocausis.—Snegirjeff, in Moscow, has for years used steam at a temperature of 100° C. in controlling uterine bleedings. In his opinion, steam cauterizes, stops hemorrhage, removes

every odor, and diminishes the sensitiveness of the inner lining of the uterus.

Pincus introduced this method into Germany. His first experience was with an inoperable corpus carcinoma, with endometritis hyperplastica, and with endometritis cervicis, obtaining good results. Since then the method has been used on many sides and for quite a series of gynecologic affections. Kahn used this procedure in many cases of septic post-partum endometritis with very quick benefit. He found that the sensitiveness of the uterus is diminished and that good contractions result. The steam has a bactericidal effect and the disagreeable odor disappears. Through thrombosis, the blood-vessels and lymph-vessels are closed and a protecting cover is formed for the development of fresh granulations. Clinically, temperature falls, usually by crisis. Only in those cases where action is delayed, or where placenta or membranes are retained, does an immediate improvement fail to result. Pincus obtained good results in putrid abortions, in climacteric hemorrhages where abrasio failed, in subinvolutio uteri and gonorrheal infections. In the clinic of Pawlik, in Prague, about fifty cases were first treated by this method, and with excellent results, especially cases of abortion with profuse bleedings due to atonic uteri, and chronic hemorrhagic endometritis.

The improvements which Dührssen made in the apparatus used for this purpose are undoubtedly responsible, in a great measure, for the good results. Originally, Pincus used metallic catheters for the intrauterine introduction of steam. Later he added a tube which permitted the outflow of the liquefied steam. Since the metal tubes caused deep cauterization and stenosis of the cervix, through direct contact of the hot catheter, he used gauze to protect this part of the uterus. Later he used tubular wooden plates to protect the lining of the cervix from cauterization.

Unfavorable results were reported, among others by Czempin, who mentioned an atrophia uteri with climacterium præcox in a patient who, six and one-half months post partum, was treated by this method for a hemorrhage lasting eight weeks. A death was reported from the clinic of Traube, due to necrosis and perforation of the uterus resulting in peritonitis. Von Weiss recorded

an obliteratio uteri in a non-puerperal case treated for continued uterine bleeding.

These failures and poor results occurred for the following reasons:

1. The introduced catheter permitted no outlet for the vapor, so that a continued action of the same resulted.

2. The heated metal catheter caused a deep cauterization, through direct contact with the cervix and uterus.

3. On contraction of the uterus the tip of the metal catheter exerted a local and deeply cauterizing action.

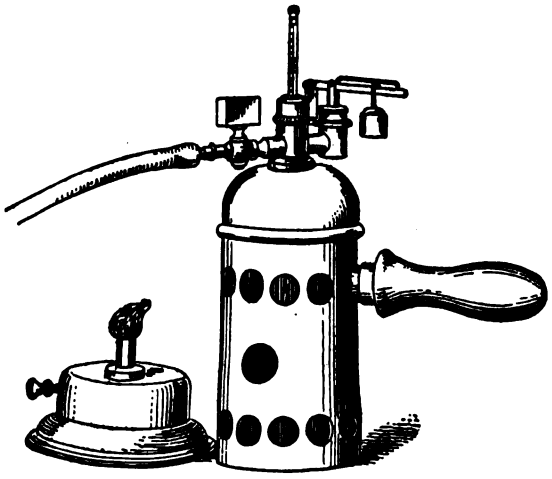

Fig. 73.—Atmocausis boiler for the production of steam which is to be introduced into the uterus for periods varying from thirty seconds to seven minutes (atmocausis). The cervix must first be well dilated and the uterine lining must be free of fetal products or of new-growths. This method is used for uterine bleedings.

The advantages of the apparatus of Dührssen (Figs. 73 and 74) are as follows:

1. The uterine tube consists of fiber stuff which does not transmit heat, so that the cervix is protected.

2. This tube is centrally perforated and its lumen is so large that when the metal tube through which the steam enters the uterus is introduced there is sufficient room for an outflow of steam and coagulated blood (Fig. 74).

3. This metal tube, through which the steam passes, does not come in contact at any point with the mucous lining of the uterus.

I have used this method mostly for bleedings which cannot be overcome by other methods. Frequent cases are climacteric bleedings, where our purpose is to cause a destruction of the endometrium with resulting obliteratio cavi. At the same time the future development of a corpus carcinoma in such cases is

rendered impossible. A dilatation of the cervix is a preliminary in all cases, not alone to permit of easy introduction of the uterine tube and to furnish subsequently good drainage, but also often to permit of tactile examination in continued bleedings. In spite of the good results obtained by this method in some patients, I have been compelled several times to perform a hysterectomia uteri.

It should be known that vaporization is used for a number of gynecologic affections, in addition to uterine bleedings due to metro-endometrial changes and to climacteric local processes. Pincus and others use this method in quite an extended class of cases. For ordinary use the duration of vaporization is thirty to forty seconds; for obliteration, five minutes or more at a temperature of 100° to 110° C. Pincus finds as indications for this method the following forms of affection: Endometritis, especially hemorrhagic and gonorrheal; incipient puerperal endometritis; uterine atony; bleeding due to interstitial myoma; subinvolution; as a preliminary to hysterectomy; as a palliative in inoperable carcinoma; in putrid abortion. To this treatment of the last-mentioned affection decided objection has been raised on many sides. In addition, the method is used by Pincus very frequently in the treatment of climacteric bleedings and senile catarrh, in both of which cases an obliteration of the uterine cavity is desired. He finds the contraindications to be malignant growths of the uterus, tumor conditions of the tubes, and adnexal abscesses.

The limits and absolute indications for this method are not clearly defined. The accepted indications for me are those followed by Fehling, who also obtained good results in bleedings due to endometrial changes, and in climacteric bleedings. He, however, on the fourth to sixth day after curettage, atmocauterized for five to twenty seconds at a temperature of 110° to 115° C. As said before, I use this method frequently for uterine subinvolution, generally for uterine bleedings not controlled by the curet or by local treatment.

The procedure in treating bleedings with this method is as follows: A positive diagnosis of the condition at hand must be made in all cases. Dilatation of the cervix is an all-important preliminary for many reasons. It permits examination of the uterine cavity with the finger if desired. If no local changes are present, and if

there is no retention of fetal membranes, not infrequently vaporization suffices without previous curettage. Retained membranes and malignant changes must be excluded before using this method. Only the finger can prove absolutely that the uterus is empty, and only curettage, aided by examination with the finger, makes it certain that we have removed those portions of the endometrium which are abnormal, and which are to be examined for malignant changes. In addition, dilatation of the cervix changes the three-cornered uterus into a circular canal, so that subsequent use of steam affects all parts of its lining equally. In addition, dilatation of the cervix permits of the use of a large uterine tube, so that when the metal catheter, through which the steam passes, is introduced, there is sufficient room in the uterine tube for the exit of the liquefied steam and coagulated blood and serum. Lastly, and equally important, is the fact that a dilated cervix, permits of a readier natural drainage of the uterus during the subsequent period. A necessary preliminary, then, not alone for the sake of a positive diagnosis, but for the other reasons mentioned, is dilatation of the cervix, for which packings with iodoform gauze or dilators are used. In simple cases with dilated cervix narcosis is unnecessary, since the uterus loses its sensitiveness on the contact of steam. It is only when this is applied to the cervix that some pain is experienced. As a rule, the cervix must not be treated, for atresia is possible before obliteration of the uterine canal in those cases where obliteration is desired. If, however, the cervix is likewise vaporized, in such cases attention must be paid to the prevention of too early atresia. On the introduction of two vaginal specula, after disinfection of the vagina and cervix with lysol, the anterior lip of the cervix is grasped with volsella. The uterine tube, having been previously boiled, is then introduced in the cervix. This tube is marked so that it can be easily determined how far it has been introduced. If the entire uterine cavity is to be treated for only a few seconds, the uterine tube is introduced as far as the internal os. If the entire uterine cavity is to be treated for several minutes with the purpose of obliterating it, the uterine tube, after previous measurement of the uterus with the sound, is introduced to within 2 cm. of the fundus, the markings on the uterine tube permitting this

to be done with exactness. The metal tube which carries the steam is then introduced, a bulb at its lower end closing the opening at the external end of the uterine tube (Fig. 74). During the process of treatment this inner metal catheter is moved occasionally to permit the outflow of liquefied steam and coagulated blood, and to prevent too high pressure in the uterus. Shortly after contact of the steam the uterus contracts, and during the following minutes the uterine tube is slowly and gradually drawn out, until, when it reaches the internal os, the entire inner surface of the uterus has been affected. If desired, the tube is drawn out up to the external os, whereby action on the lining of the cervix likewise takes place. The inner metal catheter does not extend fully up to the end of the uterine tube, so that at no time is it in contact with the uterus or cervix. The uterine tube,

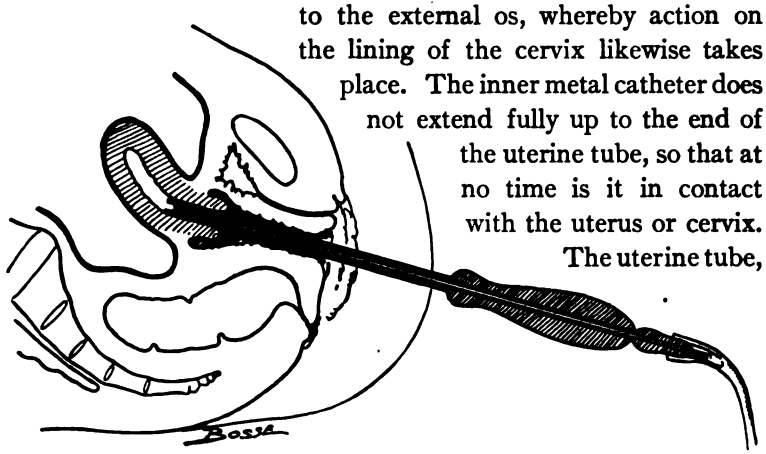

Fig. 74.—Section showing atmocausis tubes in place. The space between the inner and outer tubes is to be noted. Little knobs on the inner tube carry the altered blood down and out as this inner metal tube is drawn out slightly at regular intervals. This method is valuable for uterine bleedings, especially climacteric bleedings, when malignancy has been excluded by tactile examination and by examination of the scrapings.

being made of fiber stuff and transmitting no heat, protects the cervix fully from contact with the heated metal inner tube. After treatment, rest in bed for ten to fourteen days is necessary; no irrigations being given except a vaginal irrigation after several days, if a large serous flow makes the patient uncomfortable.

The duration of the application of steam is, as a rule, thirty to forty seconds in younger women, where no obliteration is desired; five to eight minutes if total obliteration is intended. The temperature used is 100° C. in the boiler of the instrument, which temperature is there registered by a thermometer. The

boiler of the instrument is protected by a safety-valve, which eliminates all danger, for the outlet tube is controlled by a stop-cock for two purposes: first, it may be desired to use steam of a higher temperature, which can readily be obtained if the stop-cock is closed; second, before introducing the metal catheter conveying the steam into the uterine tubes, the stop-cock is opened to see if the steam appears and to remove from the metal catheter any water. The stop-cock is then closed for a second or two until the catheter is introduced into the uterine tube. At any time, if desired, the supply of steam may thereby be shut off. (See Fig. 73).

It has been found experimentally that the steam when it enters the uterus is probably of a temperature of about 70° C., if the thermometer in the boiler registers 100°. Whether this be true or not, continued practice wtih this apparatus has shown that the above-named limits are absolute. There is generally a serous discharge for days or weeks after this treatment. The action upon the uterus and its lining may be judged by the character of the necrotic tissue which is thrown off in bits or as a whole. This necrotic tissue makes its appearance in from six to ten days if the action has been superficial, and in ten or more days if a deeper cauterization has resulted. If this method is to be repeated, it should be done only after a lapse of four weeks, when the mucous lining has been regenerated. Not infrequently, after this treatment, irregular bleedings or one or two increased menstrual bleedings may occur. The former are the result of the throwing off of necrotic tissue; the latter gradually go over into natural menstruation. The action of this method in causing involution may be seen from the fact that in a case of metritis fibrosa, with a uterine cavity 12 cm. in length, six months after vaporization the uterine cavity measured 6 cm. This patient had been curetted twice, had been treated with local applications of iodin, and with numerous internal remedies. The contraindications to the use of this method are malignant changes of the endometrium and the presence of retained placenta or membranes. Other contraindications are those affections of the tubes and those inflammatory conditions which are generally recognized as contraindications to curettage. While the value of atmocausis in other conditions is still a question of personal experience, there is no doubt that uterine

bleedings, especially the bleedings of climacterium and the uncontrollable hemorrhages occurring at this period and in earlier periods, are positive indications for its use, especially when curettage and other local methods are of no avail. Since my experience and the investigations of others have proved a large proportion of such cases to be due to degenerative changes in the uterine musculature, I may say that atmocausis, if not a specific, is at least the best method of treatment for uterine fibrosis and arteriosclerosis. If this fails, hysterectomy is indicated.

PESSARIES

A Smith or Hodge or Thomas pessary (Fig. 75) meets the indications for the correction of retroversion, retroflexion, and retrodisplacement and for the support of hysteroptosis without retrodeviation.

The shape of each pessary, as to its length and the degree of its curve, should be fitted according to the character and size of

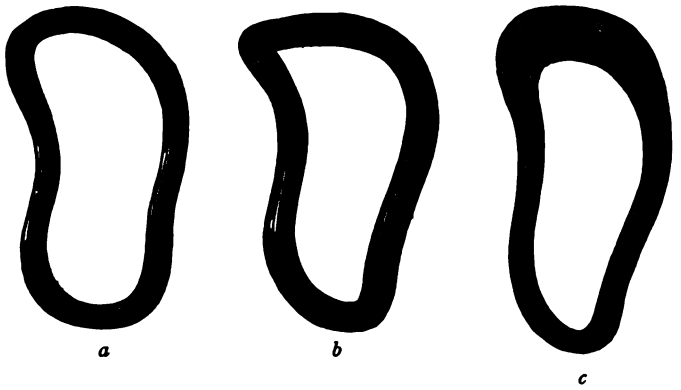

Fig. 75.—*a*, Hodge pessary; *b*, Smith pessary; *c*, Thomas pessary.

the vagina. Rubber rings of different sizes may be put in boiling water and then bent into proper form for those cases where the ready-made pessary does not meet the indications (Fig. 76). In fitting a pessary its length should correspond to the distance from the symphysis to the posterior vaginal fornix as measured by the fingers when the uterus has been replaced and the cervix has been pushed far back and high up. The width of the pessary at its posterior end must be sufficient to fill out the posterior fornix;

the upward curve of the posterior bar should be high enough to bring the posterior end high up back of the cervix. The anterior

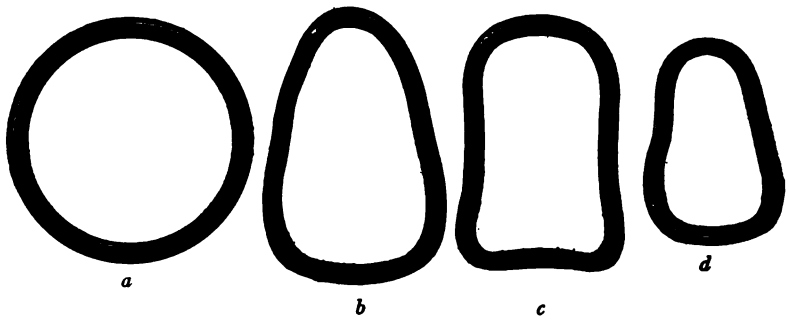

Fig. 76.—*a*, Ring to be placed in boiling water and made into any form of pessary, as *b*, *c*, *d*,

end should not be too wide, just wide enough to fit behind the symphysis, and to be supported and kept in place by the symphysis. The anterior curve should be marked enough so that the tip does not press against the urethra. The anterior bar may be indented so as to form an arch over the urethra.

Fig. 77.—Drawing showing various positions of the uterus, anteflexion, retroversion, retroflexion, with the changed position of the cervix, which has moved down and forward in the two latter.

It requires patience and frequent attempts to get the right form and size for many cases. A wise rule is that of always using the smallest possible size first, rather than taking the chance of introducing a pessary which is too large.

The pessary is supposed to be held by the levator ani muscles and by the elastic pressure of the vaginal wall. It must not be permitted to press on any bony prominence. It should cause no pain.

The pessary when in place acts by stretching the posterior

fornix, by keeping it high up and far back, and so carrying the cervix with it. When properly fitting, a pessary gives no pain or annoyance. Adhesions about the uterus or inflammation of the adnexa are contraindications to the use of the pessary. In long-standing retroflexions or in retrodisplacements where the utero-sacral ligaments are firm and contracted, preliminary treatment in the form of massage or intravaginal pressure therapy may be necessary to enable us to lift the cervix up and backward so that the fundus will naturally fall forward. In other cases treatment by glycerin and gauze is often advisable to first permit of a return

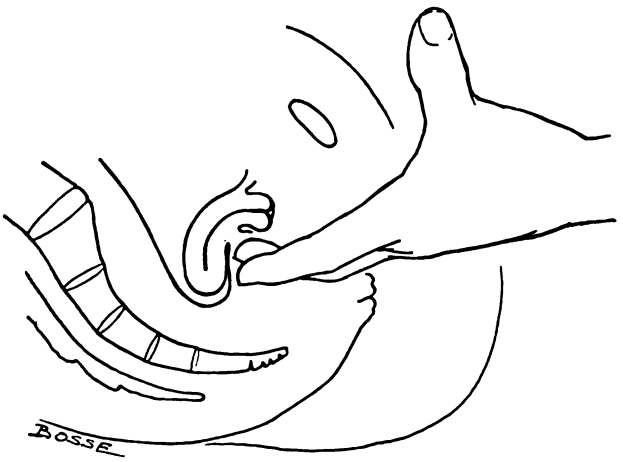

Fig. 78.—First step in the correction of mobile retroflexion. The internal fingers are introduced under and back of the cervix to lift it up.

of the subinvoluted, stretched ligaments of the uterus to their normal elasticity. In those cases where replacement is difficult in spite of the absence of adhesions, gauze soaked in glycerin, packed thoroughly into the posterior fornix while the cervix is pulled down by a volsella, is made use of on several alternate days, and will aid the subsequent ready reposition of the uterus.

Replacing the Uterus.—Without the aid of the external hand, the internal fingers should be passed deeply into the posterior fornix and underneath the cervix, and the fundus and cervix should be lifted up toward the abdominal wall (Fig. 78). This puts the uterosacral ligaments and the posterior parametrium on

the stretch. If then the middle finger be passed from right to left in the posterior fornix, thickened uterosacral ligaments can be made out and any peritoneal adhesions on the posterior wall of the uterus can be felt. At the same time the mobility of the uterus is defined, and pain will be produced in the back and in the rectum in pathologic involvements of the posterior parametrium and greater pain with peritoneal adhesions. The fundus should then be pushed upward (Fig. 79). After performing this manipulation the index-finger should be placed in the anterior fornix and the middle finger high up in the posterior fornix (Fig. 80). The

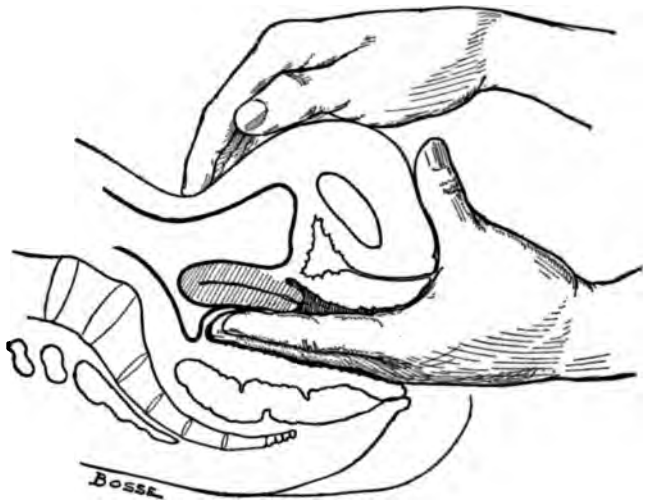

Fig. 79.—Second step in the correction of mobile retroflexion. The internal fingers pass high up into the posterior fornix and push the fundus of the uterus upward. If the fundus can be carried as high as pictured here, the external finger may pass behind it. This is rarely possible.

index-finger then pushes the cervix down and backward, which manipulation, when repeated several times with increasing firmness, always preceded by the lifting of the cervix, will bring a movable fundus further forward, away from the sacral promontory (Fig. 81), especially if the internal fingers at the beginning pushed the fundus upward (Fig. 79). If then (Fig. 81) the external hand be pressed down through the abdominal wall toward the hollow of the sacrum, behind the point to which the fundus is brought by this manipulation, and if then these fingers pull or massage the

fundus toward the symphysis (Fig. 82), almost every case of movable retroversion and retroflexion can be brought temporarily into normal anteversion or anteflexion. If the external fingers be passed behind the uterus and the uterus cannot be brought forward or can be brought forward only with pain, we may presuppose the existence of peritoneal adhesions to the uterus, or fixation of the tubes and ovaries with shortening of the ligamenta infundibulopelvica, or else we feel the retracted uterosacral ligaments. In such instances the two fingers of the internal hand being passed high up into the posterior fornix can make out the peritoneal adhesions, and if passed into the lateral fornices can make out the lateral or deep fixation of the tubes and ovaries.

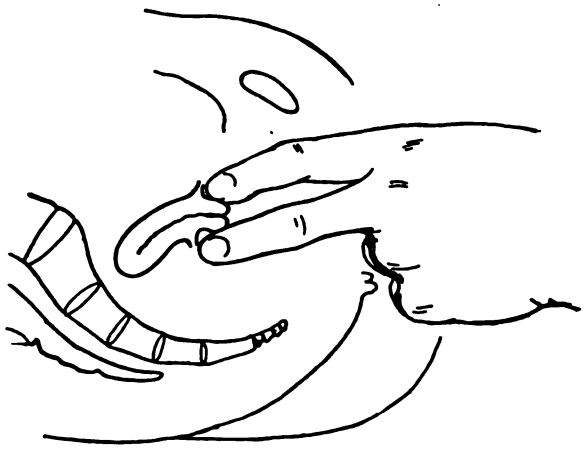

Fig. 80.—Third step in the correction of retroflexion. The index-finger in the anterior fornix is to push the cervix downward, backward, and upward, and thus influence the fundus to move upward.

Introducing the Pessary.—In introducing the pessary the uterus should first be replaced and the cervix pushed back and up with the fingers of the internal hand. The pessary should be well oiled with vaselin or soapsuds. The pessary is then introduced over the palmar surface of the fingers which are in the vagina (Fig. 83). It is introduced in a position midway between the transverse and the longitudinal diameter of the vagina, the posterior bar passing into the anterior fornix. The internal fingers then pass through the posterior curve and back over the broad bar of the pessary, and the fingers are turned so that

the palmar surface looks down. This manipulation by the fingers gradually carries the pessary into the transverse position and carries it backward toward the posterior fornix (Fig. 85). The anterior end is held by the index-finger of the other hand so that it does not press against the urethra and the symphysis, and then the posterior end is depressed under the cervix so that it slips up behind it. The anterior end should disappear behind the symphysis (Fig. 86). The patient is told to press or bear

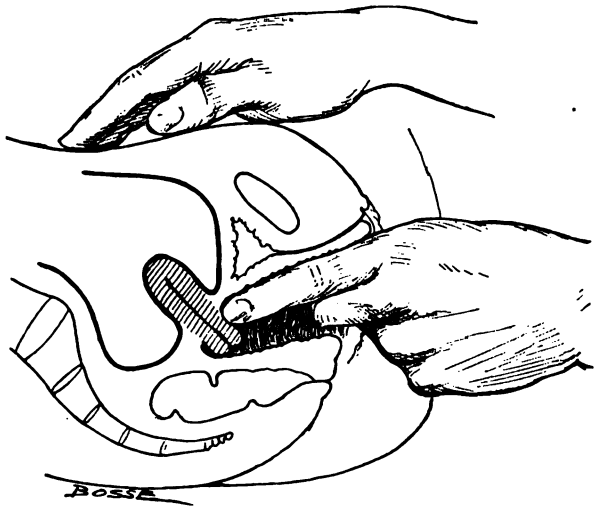

Fig. 81.—Fourth step in the correction of retroflexion. The index-finger in the anterior fornix has pushed the cervix down, back, and upward. This step, repeated several times with increasing force, has caught the fundus at the correct elevation and it moves upward and forward. The firmer the area at the internal os, the more readily is this manipulation carried on.

down as if at stool, and if the pessary is properly fitted it will remain in place and the anterior end will be only slightly visible. If too long, a shorter pessary should be used. If the anterior end is too wide, a narrower one should be selected. The pessary is of especial value in post-partum treatment to prevent the development of an acquired retroversion or retroflexion. In long-standing instances, where operation is refused, it may be worn for years if the patient takes douches daily, and if the pessary is removed, cleansed, and replaced at least once a month.

In some of these cases it may effect a cure of a long existing retrodeviation, but this result is uncertain and occurs only in a small percentage of cases (10 to 15 per cent.).

In displacements, in descent, and in prolapse the pessary fits between the uterus and the levator ani. The pessary stretches the posterior fornix and pushes the cervix high up and backward. Its power to hold the uterus depends upon the condition of the

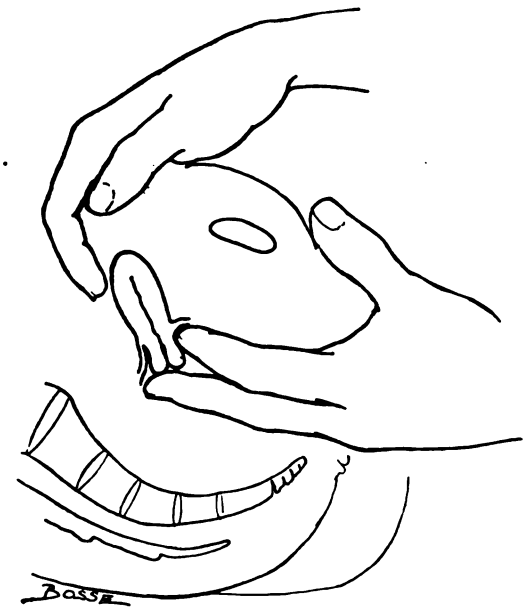

Fig. 82.—Final step in the correction of retroflexion. When the uterus has been manipulated as in Fig. 81 then the external fingers pressing deeply through the abdominal wall find themselves back of the fundus. They press the fundus forward, after the internal fingers, in front of and under the cervix, have lifted the uterus upward. The uterus is thus brought into the normal position. If now it be desired to introduce a pessary, the internal fingers must keep the cervix high up and far back. On the palmar surface of these internal fingers the pessary is introduced.

levator ani muscles and the elasticity of the vagina. If the vaginal elasticity is gone and the levator ani muscles are too lax, the pessary will not remain in place. In retrodisplacements of the uterus the pessaries of Hodge and Smith are the ones to be used.

In some cases of cystocele, with the uterus in normal position a small pessary is introduced so that the narrow anterior end does not come within an inch of the symphysis. The pessary is held

in place by its posterior bar in the posterior fornix behind the cervix. The anterior end lies along the anterior end of the vagina and lifts up and supports the cystocele.

Skene's pessary is sometimes of value in supporting a cystocele if the uterus is normally placed. The upper end of the pessary is fixed behind the cervix. The anterior end is a broad bar of a very high curve, supported by a wedge underneath it. The posterior bar fits back of the cervix and the high anterior end fits behind the symphysis and lifts up and supports the hernia of the bladder (Fig. 87).

Fig. 83.—The first step in introducing the pessary. The uterus has been brought into anteflexion. The internal fingers keep the cervix high up and back, the palmar surfaces of the two first fingers are turned so that they look almost upward, the pessary is held so that its edge does not touch the urethral canal. The pessary is passed into the vagina on the palmar surfaces of the internal fingers. The two last fingers of the left hand are flexed upon the palm.

The round, hard-rubber pessaries are used for marked descent and prolapse of the uterus and vagina (Fig. 88). In using the round ring pessaries a good perineum and fair levator ani muscles are necessary to their retention. These rings are introduced over the palmar surface of two fingers passed into the vagina. The ring is passed into the vagina in a diameter midway between the transverse and antero-posterior diameter of the vagina. The internal fingers then manipulate the ring so as to bring its opening as closely as possible over or up to the cervix and the ring lies

Fig. 84.—Second step in introducing a pessary. After the pessary has been introduced so that its upper bar is in the anterior fornix the two internal fingers pass up over this bar and are turned so that the palmar surfaces look downward.

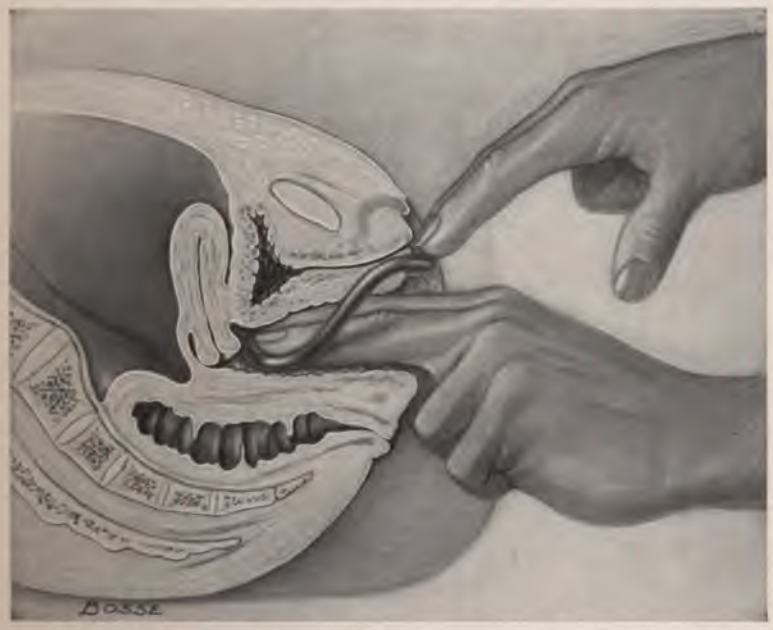

Fig. 85.—Third step in introducing the pessary. The tips of the internal fingers over the posterior bar push this bar down under the tip of the cervix and carry it up into the posterior fornix. The anterior bar is held by the tip of the index-finger of the right hand so that it does not press against the urethra as it slips into the vagina.

Fig. 86.—Pessary in place. After the pessary is in place the patient should be told to press down as if at stool to see if the pessary is accurately fitted. There is no objection to introducing the bivalve speculum and carrying out any cervical, vaginal, or intrauterine manipulation or intravaginal packing with glycerin and gauze. The presence of the pessary does not interfere with these therapeutic procedures.

transversely to the axis of the vagina. The ring, if too small, slips out readily after a few hours. If too large, it causes pain by pressure on the rectum and vaginal walls. The Menge pessary

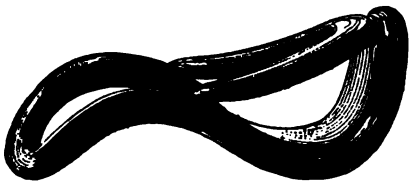

Fig. 87.—Skene's pessary, which is of aid in a few cases of cystocele. As a rule, however, the weight of the vaginal wall and bladder pushes this anterior end down and out of the vagina. Only when the posterior bar and lumen are held firmly by the cervix will the anterior end support a cystocele.

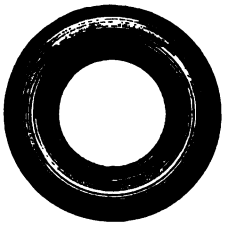

Fig. 88.—Round rings of hard rubber or wood, to support a descended uterus or to support a cystocele by lying transversely to the axis of the vagina and around or just below the cervix. This ring has been modified by a bar fitted at right angles to the ring which keeps the ring in its correct position. This is found in the Menge pessary.

has a bar fitted at right angles to the ring. This bar lies in the vaginal canal and keeps the round pessary in the proper plane. An existing vaginitis, especially senile vaginitis, should be first healed. Douches should be taken daily.

Inflammation of the vagina, urethra and bladder, erosions, acute inflammation of the adnexa, are contraindications. A pessary should never excite pain, and on pressing, bending, or defecation it should cause no annoyance. It is claimed that 10 to 15 per cent. of all retroflexions can be cured by the use of the pessary.

Fig. 89.—Intrauterine stem pessary, to be introduced into the cervix. This is done through a bivalve or other speculum (not a Ferguson). The pessary is held by a fine pair of dressing forceps. After the stem is introduced into the uterus, the vagina is packed with gauze for twenty-four hours to keep the pessary from being forced out of the cervix and uterus.

There is used for the support of a prolapsed uterus a combination of an intravaginal cup with a stem and an abdominal belt which, by the aid of strap supports, keeps the cup and stem pessary within the vagina, and so keeps the uterus within the

pelvis. This is the so-called Lavedan's cup pessary—a cumbersome and uncomfortable apparatus.

The intrauterine stem pessary may be used where there is a really marked stenosis which causes dysmenorrhea and sterility. It is perhaps more indicated in the treatment of hypoplasia and stubborn amenorrhea due to hypoplasia (Fig. 89).

The objection to the use of an intrauterine pessary is the irritation of the endometrium and of the lining of the cervix. It seems to be often used for sterility, in the belief that many of these cases are due to stenosis of the cervix or of the external or internal os. Some of these are made of parallel bars of wire, so as to permit the upward movement of the spermatozoa. All of these implements are capable of harm in the presence of cervical, uterine, or pelvic inflammation.

PRESSURE THERAPY FOR RESORPTION AND STRETCHING

The patient is placed in a mild Trendelenburg position. The Trendelenburg position elevates the uterus and its adnexa. A bag of sand may be placed on the abdomen to produce intrapelvic pressure. A condom or colpeurynter filled with shot or quicksilver is introduced into the vagina. A special apparatus has been devised by Pincus and Halban for this purpose. The action of the vaginal pressure is a pull on the shortened parametrium or bands, especially if one end of the bands or adhesions is attached to the pelvic wall. Through pressure of the sand-bag on the abdomen and pressure of the bag in the fornices the uterus is elevated and exudates are compressed. During the compression between these two forces the internal genitalia are in a state of anemia, subsequently followed by reactive hyperemia. This diminishes the chronic edema of the connective tissue and increases lymphatic resorption. The same purpose can be well obtained by introducing Champetier de Ribes bags into the vagina and distending them with water. If hot water is used, the added value of the thermic effect is obtained. This treatment is suitable in the chronic stages of inflammatory diseases; never in the acute or subacute stage. Fever is a contraindication. It is best indicated in chronic parametritis with sclerosis of the connective tissue, especially if

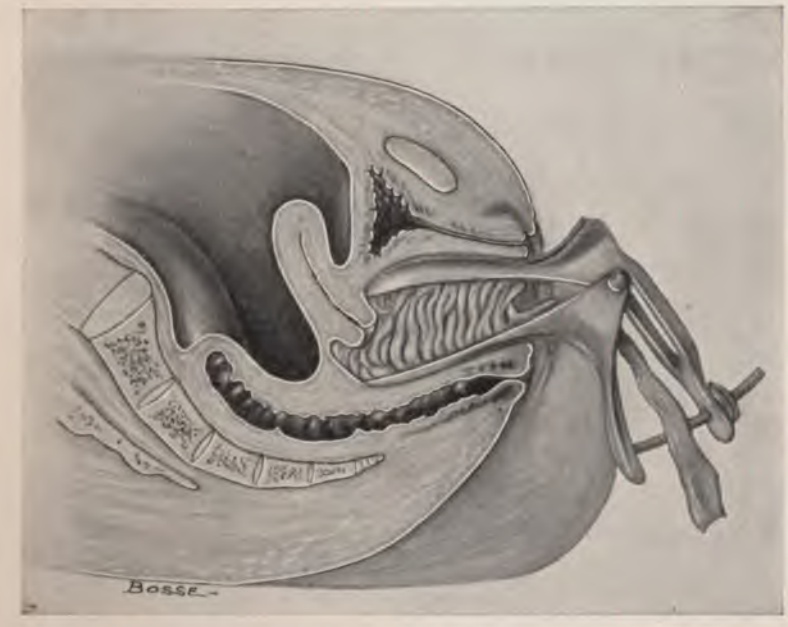

Fig. 90.—Half-section, showing the gauze in the fornices and vagina as used for the purposes of intravaginal pressure-therapy, and for other purposes in place of the routine use of cotton tampons. After the speculum is withdrawn only a slight bit of the gauze is allowed to protrude into the vulva, to render removal of the gauze by the patient easy.

there is edema. It is never to be used in pyosalpinx or pus cases. This procedure is most strongly indicated, perhaps, in involvement of the uterosacral ligaments. The subsequent treatment consists in massage and bimanual stretching. A modification of this idea is well obtained by packing the fornix thoroughly with gauze with the patient in a slight Trendelenburg position, perhaps with a sand-bag on the abdomen.

I have long discontinued the use of small vaginal cotton tampons for this purpose because of the difficulty in making them remain in the desired position. I use long strips of 6-inch wide sterile gauze. The patient is placed in a mild Trendelenburg position. With the aid of a vaginal bivalve speculum the vagina is cleansed with carbolic or lysol solution and any required treatment of the cervix, uterus, or fornices is carried out. Boroglycerin to the amount of 1 or 2 ounces is then poured into the speculum. With a very long pair of dressing forceps one long strip of the sterile gauze is gently and firmly packed into one lateral fornix, then into the posterior fornix, and then into the other lateral fornix, elevating the uterus. This packing is continued to one side and then to the other until the posterior fornix is filled and the edge of the external os is reached. Another strip of gauze of the same character is then packed into the anterior fornix until the edge of the external os is reached. Then both strips at the same time are packed thoroughly into the upper part of the vagina, and less thickly into the lower half of the vagina. If desired, the patient may be left in this position, with or without a sand-bag on the abdomen, for ten to twenty minutes. This packing is left in place for twelve to twenty-four hours, during which period, when the patient is in standing position, the action of intra-abdominal pressure and the weight of the pelvic organs presses upon the vaginal packing and pelvic exudates are compressed (Fig. 90). The uterus having been lifted up and the various ligaments or adhesions having been put on the stretch, there results, after several treatments, a diminution of exudate, a stretching of ligaments and adhesions, as a result of which uteri which are retrodisplaced through shortening of the uterosacral ligaments, or which are held in fixed retroflexion either by contact adhesion or by peritoneal adhesions, may be restored to a normal position. Another benefit is the

relief of sensitiveness and backache produced by inflammation, infiltration, or shortening of the uterosacral ligaments, or by the tugging of peritoneal adhesions. This method, when carried out with great care, and supplemented by the use of prolonged hot vaginal douches, and further aided by massage and bimanual stretching of the uterosacral ligaments and gradual bimanual attempts at replacing a displaced or retroflexed uterus, not infrequently gives excellent results in cases not complicated by pus formation, especially if the treatment is gently carried out and is not attempted too soon after the occurrence of adhesions or infiltrations. In addition, we get the markedly beneficial depleting action of the glycerin on the pelvic tissues and on the uterus and cervix.

COUNTER-IRRITATION

The abdominal wall at the so-called points of Morris may be painted with tincture of iodin, or we may apply to one or both points a mustard plaster or a cantharides plaster. These are used for the relief of pain due to chronic pelvic inflammation, especially in involvement of the ovaries, and are best applied when the pain is most severe, which usually occurs before menstruation.

A cantharides plaster two inches square is applied at Morris' points, which are situated below and external to the umbilicus. If a line is drawn to the umbilicus from the external spine of the ilium (the line on which McBurney's point is measured), a point distant one and one-half inches on this line from the umbilicus represents a point which corresponds to the lumbar plexus of the sympathetic system. The skin is washed with soap and water and then smeared with a very thin layer of vaselin and the plaster is then applied. It is held in place by two cross-strips of adhesive zinc plaster and is allowed to remain in contact with the skin until a bleb is formed, which usually takes from six to eight hours. The plaster is then removed and the bleb is incised to permit the accumulated serum to escape. The plaster is then dressed by being thoroughly covered with zinc ointment, over which a gauze dressing, held in place by zinc adhesive plaster, is made. This dressing should be changed daily until the blister is healed without the loss of skin.

Ceratum cantharadis may be used. It is spread on adhesive plaster, leaving a margin of an inch which is to adhere to the skin. This is left in place for eight hours, or for five hours only, and then followed by a hot flaxseed poultice.

Collodium cantharidatum (60 per cent.) may be applied in two or three coats with a camel's-hair brush.

Ready-made mustard plasters may be used. These may also be made by using black mustard, and flour or flaxseed meal, half and half, or by using three parts of white mustard to one part of flour. They should be applied hot for twenty minutes to one-half hour. If it is desired to apply such a mustard plaster for hours, it should contain one to three teaspoons of mustard to a poultice of flaxseed.

BIMANUAL MASSAGE (VAGINO-ABDOMINAL) IN CHRONIC CONDITIONS

Vagino-abdominal manual massage has a depletory action, through stimulation of the circulation and through stimulation of the lymph-current. Venous hyperemia and congestion are diminished and the vessels of the uterus are contracted through the mechanical stimulation. If massage is prolonged, there occurs a secondary dilatation of the vessels. Through gentle massage the uterus becomes smaller and harder. This results from mechanical stimulation of the muscle and through mechanical irritation of the cervical ganglia.

The Brandt method is used for stretching pathologic bands, for lifting the uterus, and for massaging infiltrations. The patient is on the table and the two fingers of one hand are introduced as in bimanual examination. Bladder and rectum should be empty. The external hand pressing through the abdomen is brought down to the internal hand. The external hand makes light circulatory rubbings of the skin to push the intestines aside, and then continues gently deeper circulatory rubbings in the direction of the introduced fingers. In massaging exudates the periphery should be massaged to empty the lymph-vessels, gradually passing gently toward the center of the exudate. Massage of the uterus is carried out in the same way and the tubes and ovaries are likewise so treated.

The most important action of vaginal bimanual massage con-

sists in the purely mechanical stretching of sclerotic bands and adhesions and the loosening of abnormal adhesions. The uterus and the portio are gradually lifted and pulled in various directions (Fig. 91), stretching parametritic bands or adhesions on the posterior surface of the uterus. The external hand passes over the posterior surface of the uterus, the internal fingers are applied to the portio, and gentle, steady, slight pulls of gradually increasing duration are made first in one lateral fornix and then in the other,

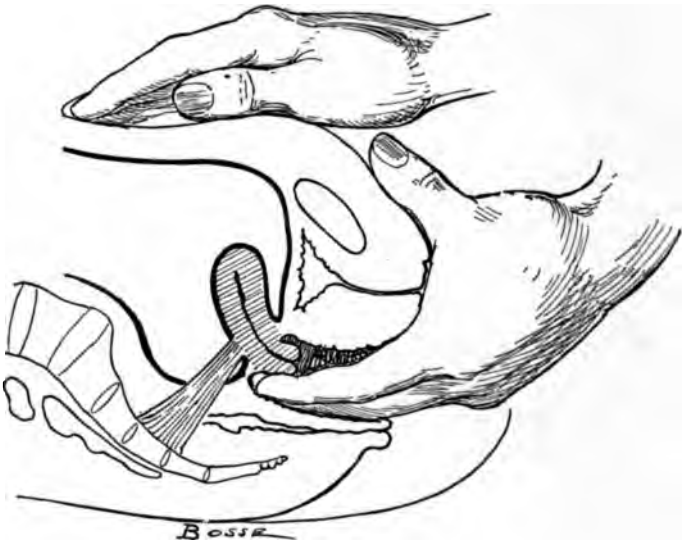

Fig. 91.—First step in stretching the uterosacral ligaments. The internal fingers back of the cervix pull the cervix upward and put the posterior parametrium and the uterosacral ligaments on the stretch. This procedure done gently and intermittently at each treatment will in the course of time, when supplemented by hot douches and by vaginal pressure therapy, aid in so stretching the shortened ligaments that a retroflexed or retrodisplaced uterus can be brought into normal position and held so by a Smith or Hodge pessary.

and then in the posterior fornix (Fig. 92). The subsequent manipulation is the same, only carried out gradually and through successive treatments, as is used in replacing the mobile uterus.

The indications for bimanual massage are old parametritic exudates, but never pyosalpinx or when there is fever. This method removes the edema in the parametrium and about the adnexa. It is especially valuable in the case of old organized sclerotic changes (Oskar Frankl).

ABDOMINAL MASSAGE

In the individual who takes a normal amount of exercise muscular contractions produce a return flow through the lymphatics of the products of metabolism. General massage exerts the same effect as exercise, but does not imply the use of physical and nervous force on the part of the patient. Massage affects the muscles, the general circulation, and the nervous system. It may be carried

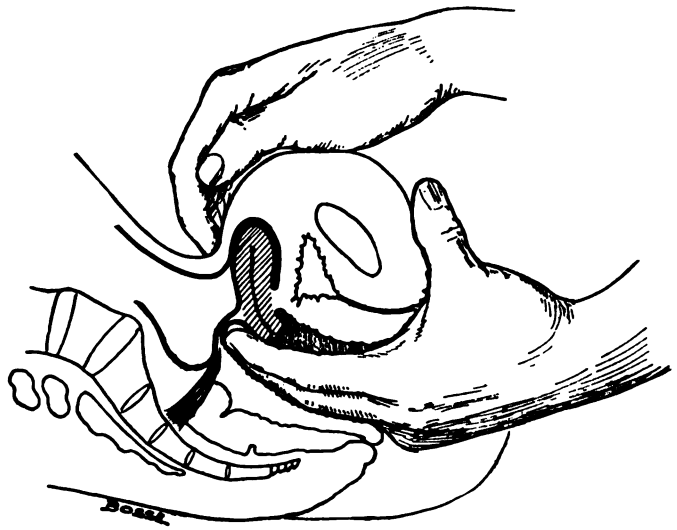

Fig. 92.—Bimanual massage, for stretching the posterior parametrium and uterosacral ligaments. The external hand, when it can be brought back of the uterus, aids the internal fingers in performing this manipulation. Such treatment, extending over many weeks and supplemented by hot douches and vaginal pressure therapy, is often an essential preliminary in restoring a retroverted, retroflexed, or retrodisplaced uterus to the normal position, in which position it can be held by a Smith or Hodge pessary, to the great relief of backache.

on upon the dry skin or, better, with the use of vaselin or cocoanut oil. In many individuals the value of massage consists in substituting or stimulating the above-mentioned processes. In addition, massage has a soothing effect and a trophic influence on the nervous system. General massage is of value, especially if aided by the faradic current, in neurasthenia, in feeble states, and in nervousness (Wood).

Local massage is used to exert an effect on local conditions. Tender spots which are due to congestion or to gouty exudations,

especially if aided by the faradic current, are benefited by local massage. Kneading associated with local massage affects the local circulation, stimulates muscle fibers, breaks up masses of adhesions, and causes exudations to disappear.

The following procedures are of special value in cases with loose abdominal walls, in weak individuals, especially if they suffer from habitual constipation, and after laparotomy.

Fig. 93.—A manipulation in abdominal massage, for loose abdominal walls. Longitudinal folds of the abdominal wall are grasped between the thumb and four fingers of either hand and are rubbed and kneaded. This manipulation is especially valuable shortly postpartum and after laparotomy.

The abdominal walls should be well kneaded, beginning at one side of the abdomen and passing gradually over to the other side. Longitudinal folds of the entire abdominal wall should be compressed, kneaded, and lifted up by a firm hold taken between the thumbs on the one side and the other four fingers on the other (Fig. 93). Exerting pressure on one side of the abdomen with the palmar surface of one hand, the closed fingers of the other hand should make circular motions pressing the ascending and

descending colon against the posterior abdominal wall (Fig. 94). When the abdomen has become less resistant, deep pressure with the thumb and forefingers separated should attempt to grasp the ascending and descending colon and the sigmoid between the fingers for kneading manipulation.

Bumm massages not earlier than two hours after eating. The patient lies flat, with somewhat bent hips and knees. The patient

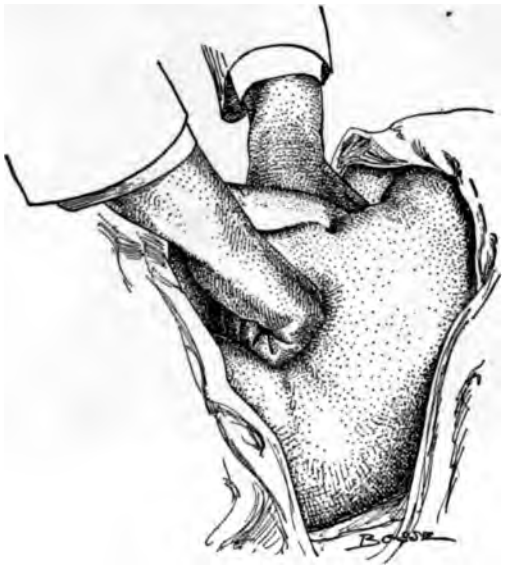

Fig. 94.—Kneading the abdomen. The flat or closed hand is pressed down on one side of the abdomen and the closed fist of the other hand makes deep rubbings and rotary movements on the other half of the abdomen. This manipulation affects not only the abdominal wall but also the intestinal tract. After both sides of the abdomen have been treated, the kneading is continued along the course of the colon from the cecum to the sigmoid.

breathes easily. Circulatory rubbings are performed, followed by kneading of the muscles of the abdominal wall and then the kneading of the colon (Fig. 95). The kneading is done with the palmar surface of the three longest fingers of one hand, which press into the abdominal wall and make small circulatory motions, pressing deeper, in order to knead the colon between the abdominal wall and the pelvic bones. The other hand is placed upon the working hand and supports it in all its movements. This manipu-

lation is begun in the region of the cecum and follows the direction of the colon.

Fig. 95.—Abdominal massage. Circulatory rubbing or rotary movements are made by the fingers of one hand supported by the other hand. The fingers are pressed down deeply to catch the intestine between the fingers and the posterior abdominal wall. Especial attention is paid to the colon (after Bumm).

Fig. 96.—Abdominal massage. The patient's abdomen is pressed against by the flat of the two hands; she is told to fill her lungs and to press up with the abdominal muscles against the resistance applied to the abdomen. This is repeated several times.

The palmar surface of both hands should be placed on the abdomen above and below the umbilicus and the patient should

be told to fill the lungs and exert pressure through the abdominal muscles in an attempt to lift the hands pressed against the abdomen (Fig. 96). Then again the patient is told to fill the lungs and to press upward with the abdominal muscles, and then the palmar surface of the two hands press gently but firmly on the abdominal wall, in an effort to overcome this resistance of the abdominal muscles (Fig. 97). Each of these manipulations should be done ten times. The patient lying perfectly flat and the legs below the knee being held down gently, she should slowly and grad-

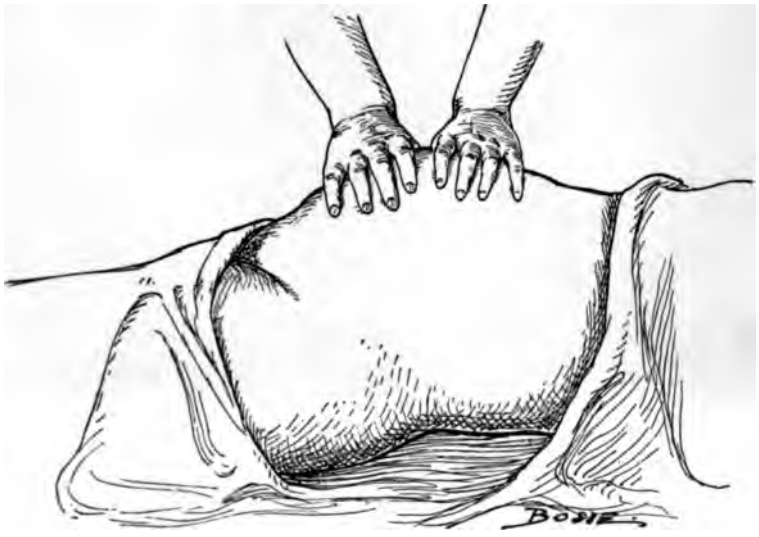

Fig. 97.—Abdominal massage. The patient fills her lungs and presses up with the abdominal muscles. The two flat hands are then applied and pushed down firmly in the attempt to overcome the abdominal resistance offered by the patient. This is repeated several times.

ually, with her shoulders thrown back, raise herself to a sitting position, and then gradually return to the lying position. This manipulation should be done by the patient at her home, morning and night. Another procedure to be carried out by the patient at her home is the act, when lying flat, of lifting her legs, held straight, upward slowly to a position at right angles with the body, and then letting them slowly down to a straight line with the body. This should be done ten to twenty times, morning and night. Massage and the action of the sinusoidal current are fully discussed in the section on Constipation.

ABDOMINAL SUPPORTS

Elastic abdominal belts, held in place and prevented from slipping upward by straps or rubber tubing which passes between the thighs, are often of great value, especially in supporting the loose abdominal walls so often associated with gastro-enteroptosis and various degrees of hysteroptosis (Figs. 98, 99). In these cases they give support to all the intra-abdominal organs, give the patient a sense of elasticity, and tend to diminish pelvic and abdominal congestion and the various associated dyspeptic annoyances. In addition, a binder is of great value after the fifth month of pregnancy in supporting the abdominal wall and the fundus

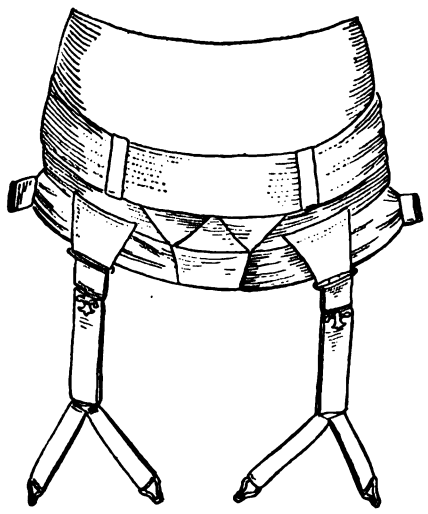

Fig. 98.—The Storm binder, one of the best of the abdominal supports for loose abdominal walls, for splanchnoptosis, and for use during the later months of pregnancy.

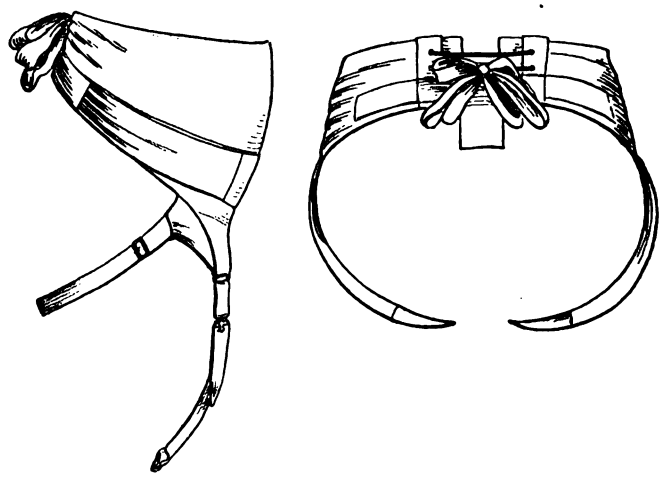

Fig. 99.—The Storm binder, side and back views.

of the uterus, taking the strain of stretching off the abdominal walls. In the post-partum period, when the patient first gets up and about, several weeks and sometimes months elapse before the abdominal wall and the intra-abdominal organs are involuted. During this period, in which Nauheim baths, the sinusoidal current, and abdominal massage are used, the abdominal walls may be supported by the aid of such an elastic abdominal belt, which in all cases should be made and fitted to the individual figure by the accurate measurements and fitting of an experienced manufacturer. To a very great degree the need of such belts is diminished by the wearing of what are known as straight-front corsets, which support the abdominal wall and lift up the lower half particularly of the abdominal contents (Fig. 100). These corsets are devised to avoid contraction of the waist and of the thorax. The ordinary straight-front corsets are harmful in the post-partum period, nor should they be permitted in the later months of pregnancy. The belt and corset should be applied while in the lying position. The question of abdominal supports is fully discussed in the section on Constipation.

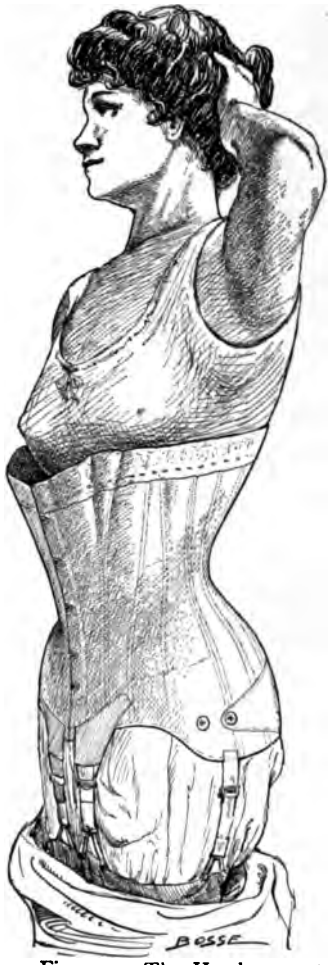

Fig. 100.—The Heath corset, one of the best of the straight-front corsets for supporting the intra-abdominal organs in splanchnoptosis. It is so loosely made in its upper half that it does not compress the abdomen, nor does it compress the thorax or breasts.

THE PRODUCTION OF PELVIC HYPEREMIA AND ANEMIA

The production of arterial hyperemia increases the nutrition of tissues, stimulates local tissue change, and increases the regenerative functions. If the tissues and cells are better nourished

as a result of hyperemia, and if their antitoxic power is increased, the cells and their energy are preserved. The production of hyperemia in the pelvis is indicated in edematous swelling of the genitalia, in old hard exudates, in non-purulent inflammations of the adnexa in the chronic stage, in old parametritis, in infiltration of the uterosacral ligaments. Hyperemia makes scars and sclerosed bands due to parametritis and perimetritis more succulent, and renders subsequent stretching easier and less painful. It should not be produced in the presence of fever. If, however, cells and tissues are severely involved, then the increased hyperemia and increased tissue changes hasten the purulent degeneration of the tissues (Oskar Frankl).

The production of anemia or contraction of the vessels in inflamed pelvic organs has an antiphlogistic and depletory influence. When produced in congested hyperemic areas, it diminishes bleeding or the tendency to bleeding. It is indicated in acute inflammatory conditions, such as perimetritis, parametritis, endometritis, salpingo-oöphoritis, in hyperemia, climacteric bleedings, other bleedings, etc.

Changes in the circulation of the pelvic vessels may be produced by applications to the abdomen or to the vertebræ, by douches, by sitz-baths, and by full tub-baths.

A long water bag is of value for applications to the lowest vertebræ (Figs. 101, 102). In this location we accomplish with certainty a reflex effect on the uterus. If filled with cold water, it is used in sexual excitement, nymphomania, and for pollutions. If filled with hot water, it is of value for menorrhagia and metrorrhagia. Olshausen places bleeding patients on a bag of hot sand. Through such warm applications to the lower vertebræ we readily cause uterine contractions.

Abdominal Applications

The use of the ice-bag and of the hot-water bag applied to the abdomen are too well known to require elaboration. The rules governing their application are the same as those noted below. The ice-bag should not be applied directly to the skin, but should be separated from the skin by a dry cloth or compress. It should be removed at intervals as soon as it causes local discomfort. Instead of the ice-bag, the cold coil may be used. Cold is of value in acute inflammatory pelvic conditions

Abdominal applications by means of moist cloths or towels are of great importance for the production of pelvic anemia or

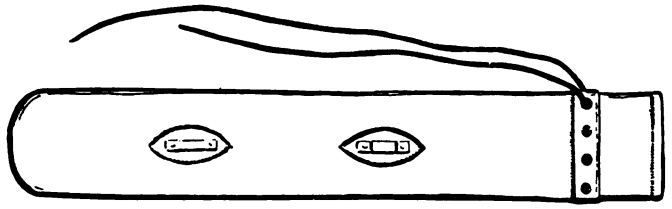

Fig. 101.—Long rubber water-bag, to be applied to the spine when filled with hot or cold water to cause either pelvic anemia and contractions of the pelvic vessels (hot water) or pelvic hyperemia (cold water). Two little straps are attached to the bag so that bands, passed through them and around the abdomen, keep the bag in place even if the patient turns on her side. The upper end is rolled in and the string is laced over it.

hyperemia. The moist cloths should be covered by a dry permeable towel.

Anemia in the pelvic organs can be caused by moist cool applications (under 70° F.), which must be changed often. Such applications in the region of the hypogastrium have the same effect as a prolonged cool sitz-bath. They have an antiphlogistic and depletory influence on the pelvic organs. They are used in hyperemic and acute inflammatory changes, such as perimetritis, parame-

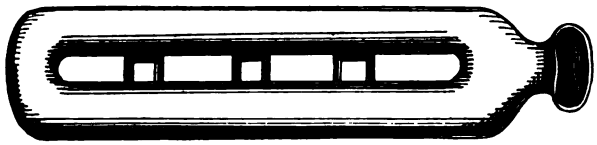

Fig. 102.—Chapman's water-bag, to be applied to the spine for the same purpose as mentioned in Fig. 101.

tritis, endometritis, salpingo-oöphoritis. Cool local applications are used in pruritus vulvæ.

Hyperemia can be produced by warm applications, 95° to 105° F., which should be changed often. They cause hyperemia of the skin and of the pelvic organs, and hot ones (105° to 112° F.) cause a permanent dilation of the vessels. Warm and hot applications are used in menstrual colic, for old hard exudates, in the chronic stages of inflammation of the uterus and adnexa when there is no fever, no pus, no pregnancy, and no marked bleeding. They are also used locally in vulvitis and Bartholinitis.

Hyperemia can be produced by stimulating applications which consist of cool moist cloths (under 70° F.) covered with a dry towel which is not impermeable. They are changed only every four or five hours. A Priessnitz bandage may be used. It is a broad linen band 9 feet long. The first third is moistened in cold water and wrung out. It is applied to the abdomen and the dry two-thirds are then wound around the body. Stimulating applications at first have the same action as the cool ones, but soon the moistened band becomes as warm as the blood, and a hyperemia or reaction takes place. This warm blood passes from the skin deep down and causes a dilation of the vessels and an increased flow of blood to the internal genitalia. These stimulating applications mildly stimulate tissue change and resorption in the subacute stages of inflammation, such as exudates, etc. (Oskar Frankl).

Vaginal Douches for the Production of Pelvic Anemia or Hyperemia

The value of douches is represented by the cleansing effect, by the action of the medical ingredients, and, most important, by the thermic effect of the water.

The patient should lie on her back on a douche pan; the height of the bag should be 2 feet above the pelvis; the tube should be preferably of glass with closed ends, but with several lateral openings about the tip. Inasmuch as in prolonged douches the effect of temperature is desired, a water-bag containing 4 quarts may be made to last a quarter of an hour, if, during the taking of the douche, the rubber tube of the hot-water bag is compressed with the fingers as soon as the hot water is distinctly felt, the pressure being released every half minute to allow fresh water to run into the vagina and to exert its thermic influence.

Anemia.—Cool douches (under 70° F.) of short duration stimulate the tone of smooth and striped muscle fibers. The musculature of the vessels is contracted by short cool douches, but this does not last long. Cool douches are used when there is a tendency to prolapse and descent, when there is hyperemia, and when there are climacteric bleedings. Hot douches also stimulate the tone of smooth and striped muscle fibers if their duration is not too long. The vessel musculature contracts as a result of hot douches. Therefore hot douches stop bleeding, if they are not too prolonged (if taken for twenty minutes there

results a subsequent relaxation of the vessel musculature). Short hot douches (105° to 112° F.) of 1 to 3 quarts are used for climacteric bleeding, for menorrhagia, and for the bleedings of uterine atony and uterine myomata. The contraction of the muscles of the pelvic floor occurs actively as a result of hot douches.

Hyperemia.—Of greatest importance is the active hyperemia produced in the pelvic organs by warm and prolonged hot douches. Associated with the hyperemia is an increase in the lymphatic circulation, with increased local tissue change and resorption of exudates. Warm douches of 90° to 105° F. in large amounts are used for spastic dysmenorrhea and for the colic of metro-endometritis if the adnexa are free. Prolonged hot douches are used up to 112° F. in amenorrhea, slight menstruation, chronic endometritis and metritis, subinvolution. They are contraindicated where there is fever, in fresh inflammatory processes, in the presence of purulent accumulation, such as pyosalpinx. Very hot douches, 120° F. or more, and prolonged in duration, are used for sclerotic and shrunken tissues and bands associated with dislocation of the internal genitalia, and for hard, firm exudates, in the fever-free stage. Hyperemia prepares the tissues for massage.

Sitz-baths for the Production of Pelvic Anemia or Hyperemia

The use of this procedure, as a rule, demands a deep sitz-bath tub, with a support for the back, two-thirds full of water (Fig. 104). The patient should wear a gown, stockings, and slippers. When seated, the pelvis up to the umbilicus and the thighs almost up to the bend of the knees are covered with water. A shawl or blanket is thrown about the shoulders and covers the patient as she is seated in the tub. After the bath the patient at once goes into bed on an extra sheet, with which she is quickly dried, and is then covered with blankets.

A sitz-bath in which the patient is seated in a bath-tub with sufficient water to cover the body up to the umbilicus may be given as a modified form of the Nauheim bath if salt (3 pounds) and calcium chlorid (3 ounces) are added. The effect of such a bath is to influence pelvic congestion and to alter the pelvic circulation. It is, however, associated with no constitutional benefit, as in the case of the complete Nauheim bath.

Anemia of the pelvic structures is produced by a cool, prolonged sitz-bath, 50° to 65° F., duration five to thirty minutes, which causes

Fig. 103.—Sitz-bath.

long vessel contraction of the genital organs. The indications are climacteric bleedings, congestion of the pelvis and its associated dysmenorrhea and menorrhagia, pruritus vulvæ, and vaginismus depending on a neurasthenic base. They are contraindicated in anemic and weak individuals and in uterine colic.

Fig. 104.—Sitz-bath tub.

Anemia of the pelvic structures is also produced by a tepid sitz-bath, 70° to 85° F., five to fifteen minutes, which causes a contraction of the vessels in the pelvis. It has a restful effect and can be used in weak individuals and in those who cannot at first stand the colder baths. It is useful in inflammation of the uterus and vagina.

Hyperemia of the pelvic organs is produced by a short, cool sitz-bath, 50° to 65° F., and lasting one to five minutes, which causes

a contraction of the peripheral vessels and of the vessels of the pelvic organs. After leaving the bath there is a reactive dilatation of the skin vessels and of the vessels of the pelvis. This bath causes a reactive flow of blood to the inner genitalia. This short, cool bath is used in those cases in which we wish an active hyperemia and a stimulation of the motor and secretory functions of the uterus, as in amenorrhea, leukorrhea, in not too weak individuals; in hypoplasia, in asthenic uteri with metrorrhagia and menorrhagia, in chronic metritis and subinvolution. It is contraindicated in acute and subacute inflammations of the genitalia, in pregnancy, and when there is great pain.

Hyperemia of the pelvic organs is produced by warm sitz-baths, 90° to 105° F., ten to thirty or forty-five minutes, which cause a flow of blood to the pelvis and its organs, and are used to cause a hyperemia of the genitalia, to stimulate resorption, and to exert a sedative effect. They are indicated in hypoplasia, amenorrhea and slight menstruation, in spastic dysmenorrhea, in chronic metro-endometritis and chronic parametritis and perimetritis, in hard exudates after the fever stage is over, in salpingo-oöphoritis when there is much pain without fever and when there is no pus. They are also useful in the chronic stages of cystitis or tenesmus, but never for acute gonorrhea; never to be used in pregnancy, menorrhagia, metrorrhagia, or accumulation of pus in the pelvis.

ELECTRICITY

The Galvanic Current.—The positive pole (anode) has a hemostatic, anesthetic effect. It stimulates contraction, narrows the vessels, and is antimycotic. The negative pole (kathode) produces hyperemia, diminishes pain, and aids resorption. For the use of galvanism one needs:

A battery with a current up to 130 milliamperes (Fig. 105).

Two electrodes.

An inactive abdominal electrode of lead, which should constitute a wide plate separated from the skin by a thoroughly moistened pad (Fig. 109).

For the vagina, special electrodes are used (Fig. 106, *a* and *b*).

For the uterus, aluminum electrodes of the shape of a sound are

necessary with the vaginal part made of hard rubber (Fig. 110, *b*, *c*, *d*), or else olive-shaped removable tips are used, which are to be fitted on the end of an intrauterine holder.

Intrauterine galvanism is to be used only when inflammation of the adnexa is absent. Thorough antiseptic precautions must be used before the sterile unipolar electrode is introduced into the uterus. We begin with a current of 1 milliampere and gradually go up to 10 to 25 milliamperes for three to seven minutes twice a week. Severe pain should never be caused. The current is increased gradually and is gradually reduced. The abdominal and

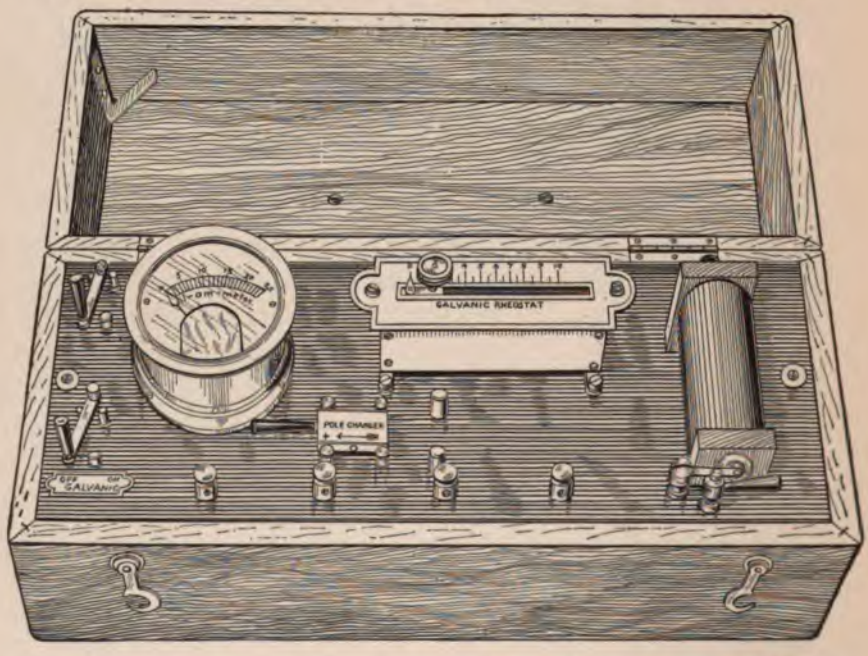

Fig. 105.—Battery for the production of galvanic or faradic currrent or of both currents combined. The strength of the galvanic current applied is registered by the meter, and is increased by the rheostat.

intrauterine electrodes should be held quietly and steadily. With galvanism the unipolar electrode is always used.

Indications for the Use of the Galvanic Current.—Galvanism for myomata only stops the bleeding temporarily, but improves the nervous symptoms and diminishes pain. It does not diminish the size of the tumor. Only interstitial myomata are to be treated. The effect on subserous tumors is *nil* and gangrene

of the capsule and degeneration are to be feared in the case of submucous myomata.

For the bleeding and pain of small interstitial myomata in women near the climacteric age and for the bleeding of subinvolution the anode is used within the uterus and the inactive electrode is the abdominal plate. In the treatment of bleedings as many as fifty sittings may be necessary and currents up to 150 to 300 milliamperes have been used. The hemostatic effect often comes only after many treatments, and at first there is apt to be an increased flow of blood, which is of no significance. If, however, the bleedings are markedly increased and last long, galvanism will not bring about a cure. Frankl advises the application of a cold Priessnitz bandage for a half hour after each treatment.

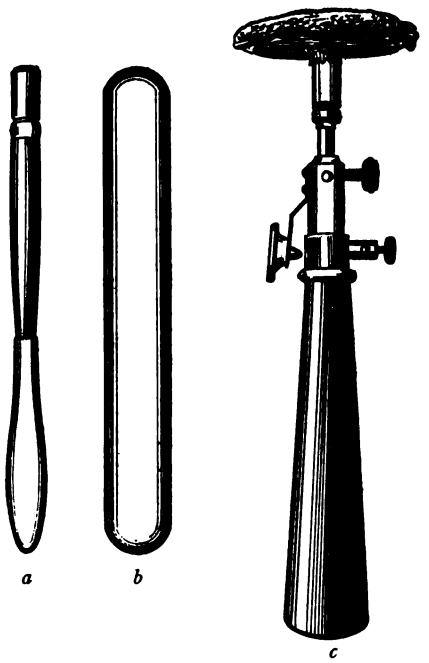

Fig. 106.—*a*, Vaginal metal electrode; *b*, vaginal non-metallic electrode; *c*, small electrode for external use (Frankl).

The *negative* electrode applied within the cervix relaxes the cervical muscle and elastic fibers, and the canal becomes dilated. At the same time a hyperemia is produced. It disinfects the canal and tends to free it of inflammatory accumulations. When introduced the full length of the uterine cavity, the hyperemia which it produces has a beneficial effect in chronic inflammation. In cases of small undeveloped uterus it produces a hyperemia which tends to develop this organ. It is, therefore, a valuable procedure in dysmenorrhea due to cervical stenosis, in cervical catarrh, in chronic inflammatory endometritis, in pelvic inflammation not associated with the accumulations of pus, in hypoplasia, in lactation atrophy. The use of the long negative intra-uterine electrode with current of 5 to

10 milliampères for a period of five to ten minutes, applied two or three times a week for several weeks or months, is the best all-round routine treatment for sterility, when the husband is not at fault, and in the absence of tangible tubal or peritoneal inflammation.

The positive electrode has the power to cause uterine contractions, but its use, even with only a current of 5 to 10 milliampères,

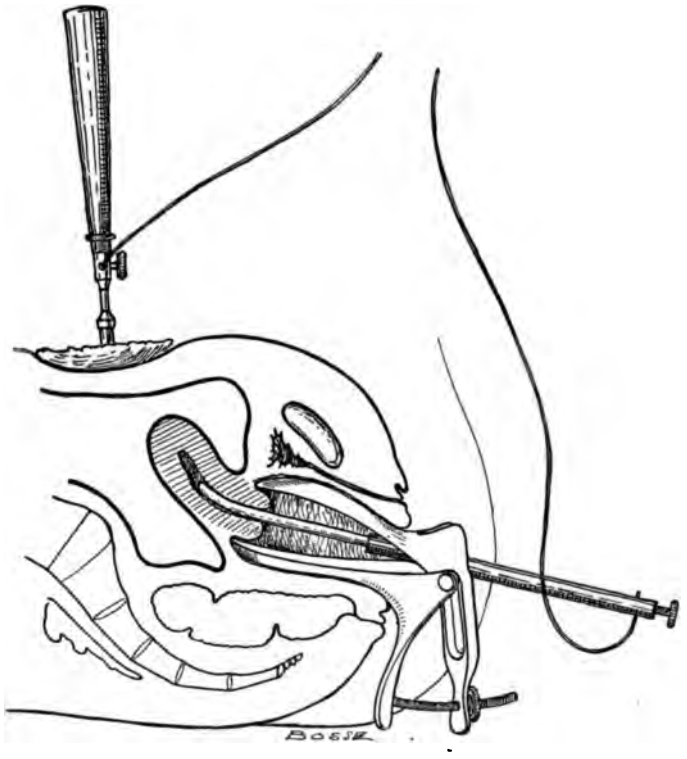

Fig. 107.—Intra-uterine electrode in place with small electrode on abdomen.

often provokes pain. Its regular application two or three times a week for several weeks, duration from five to fifteen minutes, is of value in subinvolution of the uterus, in atony of the uterus, in fibrosis uteri associated with irregular bleedings, in pelvic congestion, and in some cases of bleeding due to fibroids. The results desired by the use of the positive pole are obtained usually only after many applications. The therapeutic results desired from the

use of either the negative or positive intra-uterine electrode are markedly enhanced by any form of hydrotherapy applied for the purpose of producing either pelvic hyperemia or pelvic anemia. For this purpose the sitz-bath of proper temperature is the best.

In the case of intra-uterine applications of electricity the other electrode may be a small one, applied over the region above the symphysis (Fig. 107) or to the right or left of the median line; or a large plate electrode may be applied over the lower abdomen, or over the sacral region, or along the spine between the shoulder-

Fig. 108.—Plate electrode applied between shoulder-blades before the patient lies down on office table. The other electrode is applied to the cavity of the uterus.

blades (Fig. 108). This latter point of application I have found to be a good one in nervous or neurasthenic patients, for the pelvic effect is gained as desired, and in addition we have the actual or suggestive influence of the spinal application.

For intra-uterine application we have short electrodes of a length sufficient to just pass the internal os, or longer electrodes of a length sufficient to reach the fundus. It is desirable to use as large

an intracervical or intra-uterine electrode as possible. One should always begin with the smallest size, and the introduction of the electrode should always be carried out easily (gently) without the use of force, so as to avoid any tendency to bleeding.

It will be found that with the use of the negative current the cervix dilates or relaxes, so that in the course of several sittings the largest size electrode may be used in many cases. When using the positive electrode the change to a larger size is not made so readily, for the cervix contracts about the electrode or the uterus contracts, and pains are readily produced.

Electricity is also of value in the treatment of constipation or abdominal subinvolution. In the postpartum stage, electricity, especially the sinusoidal current, has marked advantages.

In the treatment of constipation, if the Boas electrode is used, the other electrode may be applied in succession to various parts of the abdominal wall, or the large plate electrode may be applied along the colon or over the sigmoid area.

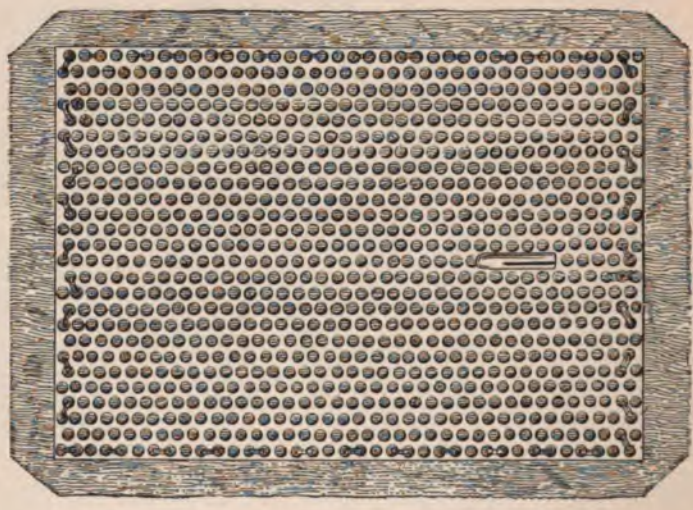

Fig. 109.—The large abdominal plate of lead, with attached lining which is thoroughly moistened before being applied.

For amenorrhea of hypoplasia: negative electrode within the uterus, lead plate on abdomen.

For ovarian neuralgia: positive electrode in the vagina, lead plate on abdomen.

For vaginismus: positive plate on the vulva, negative on sacrum—weak current five minutes.

For pruritus vulvæ: non-metallic positive electrode in the vagina, negative for ten minutes on the affected area.

The Faradic Current.—The faradic current (primary) causes

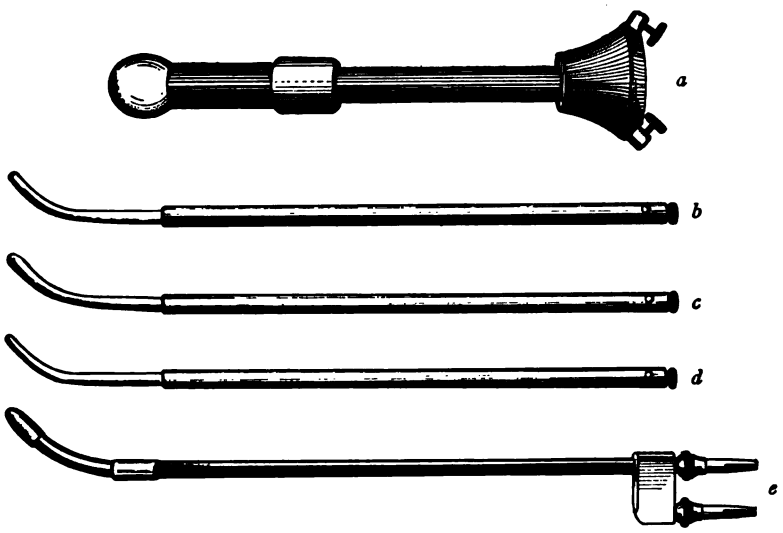

Fig. 110.—*a*, Bipolar vaginal electrode for faradism; *b*, *c*, *d*, intrauterine electrodes of different calibers for galvanism or faradism; *e*, intrauterine bipolar electrode for the faradic current.

contraction of smooth and striped muscle fiber. The secondary current acts on the nerve structures and diminishes pain.

The intensity of the current is fitted to the subjective reaction of the patient by gradual increase in strength for ten to twenty minutes.

For the faradic current the same electrodes as in galvanism are used, but bipolar electrodes, which do away with the use of the abdominal plate, may be employed. These are fitted for use in the vagina and uterus (Fig. 110, *a* and *e*). The indications are:

Subinvolution—which is treated by vagino-abdominal faradism or by bipolar intrauterine faradism to stimulate contraction.

Amenorrhea due to hypoplasia—treated by utero-abdominal faradic current or by bipolar intrauterine faradism.

Dyspareunia—vagino-abdominal current.
Ovarian neuralgia—vagino-abdominal current.
Vaginismus—bipolar faradic.

TABULATED INDICATIONS

- **Positive Pole (Anode)**
  - Hemostatic
    - Interstitial myoma (anode intrauterine)
    - Ovarian neuralgia (anode in vagina)
  - Anesthetic
    - Vaginismus (anode on vulva, kathode on sacrum)
- **Negative Pole (Kathode)**
  - Causes Hyperemia
    - Dysmenorrhea (kathode intrauterine)
    - Amenorrhea (kathode intrauterine)
    - Cervical stenosis
    - Cervical catarrh
    - Inflammatory endometritis
    - Uterine hypoplasia
    - Lactation atrophy
  - Anesthetic
    - Pruritis vulvæ (kathode on affected area, positive in vagina)
- **Faradic Current**
  - Contracts Muscle
    - Subinvolution
      - vagino-abdominal or
      - bipolar intrauterine
    - Amenorrhea
      - utero-abdominal or
      - bipolar intrauterine
  - Anesthetic
    - Dyspareunia
    - Ovarian neuralgia
      - vagino-abdominal
    - Vaginismus (bipolar vaginal)

The value of electricity in the treatment of splanchnoptosis, in post-partum treatment, etc., is shown in the section on Constipation.

INFLUENCE OF COOL AND COLD WATER APPLIED TO THE BODY

Winternitz and his school have taught us the effect of water of different temperatures, and we have in hydrotherapy a powerful oxidation therapy whereby, through thermal and mechanical influences, activity and function, hunger and revulsion, can be produced in the cell. Hydrotherapy is a powerful curative method, since thermal and mechanical processes are the normal stimuli which arouse, strengthen, and regulate our organic functions in a physiologic way. An important effect of hydrotherapy results through its influence in *changing and altering the blood distribution*, through the withdrawal of blood from congested and overloaded organs, whereby circulatory disturbances may be corrected. The value of such a change and its influence upon congestions in the pelvis may be recognized when we consider that, next to the peripheral, the region of the pelvic vessels with their large venous plexuses is one of the most important elements in regulating blood-distribution and blood-pressure. Since the blood-channels and lymph-channels furnish the material for the organic functions and

for the nutrition of the organs, the circulation of any part is one of the most important factors in preserving its tone.

The use of cool and cold water influences also a change in the morphologic character of the blood. It causes not alone an increase in the number of leukocytes, but likewise a decided increase in the number of red blood-corpuscles. A necessary factor in obtaining this result is the production of a decided hyperemia of the skin. If the skin remains cool for a considerable time, and if a ***complete reaction*** is not excited, this change does not result; for then these cells, probably preformed blood-cells, do not enter the general circulation. Since after warm baths the increase in the number of erythrocytes is much less, this increase rests clearly upon changes in the circulation, in the heart's action, and in vessel tonus and tissue tonus. The blood richer in cells, richer in oxygen, makes the entire tissue change more complete, and causes an increased consumption of oxygen and an increased giving off of CO_2. The resulting increased production of heat is reflexly regulated, and not by the degree or amount of heat withdrawn, but by the degree of the thermal nerve stimulus. Increased tissue metamorphosis is brought about reflexly through the influence of cold.

The combination of cold with a mechanical stimulus increases the reaction. Cold water causes a contraction of the peripheral vessels and brings about, through thermal stimulation of the vagus, a slowing of the pulse, increases the oxidation processes in the body, and exerts a stimulating effect on the central nervous system. An important result of the contracting influence of cold is the increase in the venous tonus. Since cold temperature opposes the dilation of the peripheral vessels, mechanical stimuli are necessary to bring about a dilation, so that in hydrotherapy the mechanical stimulation, frottement or rubbing, must be combined with a thermal procedure to bring about peripheral relaxation; for only with the resulting sinking of the tension and of the blood-pressure (reaction) comes a feeling of well-being, and only those thermal processes can be considered trophic which influence the heat balance of the body, and only those can be considered tonic which lead to reaction (Winternitz).

Prolonged cool half baths, taken in a sitz-bath-tub with the water reaching to the umbilicus, or cool sponge baths are used for nymphomania and for pollutions.

In anemia and chlorosis and mild neurasthenia we may use short procedures with water, which do not extract heat and which are combined with mechanical rubbing to produce a reaction. We may begin with sponge-baths at 70° F., followed by rubbing of the body with a rough towel, and diminish the temperature by a degree or two every other day. This may be substituted at later periods by a more general rubbing with water or by tepid shower-baths. Sponge-baths and rubbings are of value to accustom patients, especially chlorotic and obese girls, to subsequent full baths.

Ablutions, drip sheet, half-bath, and **wet pack** are of value in chlorosis, anemia, and mild neurasthenias.

Ablution.—The patient stands in a tub containing 12 inches of water of a temperature of 100° F., and is rapidly washed down with the hands covered with a bath towel, or gauze, or a linen wash-cloth. The water with which the patient is washed down is of a temperature of 80° F., which is poured upon the body with the hand or from a vessel, followed by gentle friction. The temperature is lowered day by day by one or two degrees until finally water of a temperature of 60° F. is used.

Drip Sheet.—The patient stands in a tub containing several inches of water of a temperature of 100° F. A sheet dipped in water of a temperature of 80° F. is wrapped snugly about the patient; the border is tucked in around the neck, the lower border is wrapped around the legs, and the attendant makes rapid passes over the sheet up and down the back, sides, lower extremities, and occasionally slapping the surface to increase mechanical irritation (Fig. 111).

Two or three times, at short intervals, a basin of water 10 degrees lower than the sheet water is poured on head and shoulders. This is alternated with friction for from five to ten minutes. When sheet is withdrawn, the skin is generally hyperemic. Patient steps on woolen rug and is dried thoroughly, followed by friction and warm sheet or towel to increase the cutaneous suffusion, two to five minutes for tonic effect. By wringing out the sheet, by using lower temperature or shorter time, or by slapping instead of passing outstretched hand on sheet, the local excitation of cutaneous nerves and vessels is altered to any desired degree (Baruch).

Wet Pack.—Two large woolen blankets on a mattress, with or without rubber sheet. Large coarse linen sheet, well wrung out of water (60° to 70° F.), is spread on blanket (Fig. 112). Patient with arms above head lies on junction of middle with right third of sheet. Sheet is drawn across body from left to right and then from right to left, covering the arms, which are now extended to side of

Fig. 111.—Drip sheet.

body. Blanket is now drawn over in the same manner, so as to absolutely exclude air from beneath the blanket cover (Fig. 113). Patient is now covered with several woolen blankets, if chilly. Wet turban on head. Duration one-half to one hour. All wet packs must be followed by some hydriatic method to restore cutaneous tone of relaxed vessels, most readily by a half-bath.

Cold damp sheet irritates cutaneous nerves and vessels and

Fig. 112.—Wet pack, I. (After Baruch.)

Fig. 113.—Wet pack, II.

causes contraction. Then comes reaction without aid of mechani-

cal irritation. Hence, we must be sure of reactive ability on part of patient. First shock lasts from five to ten minutes, then cutaneous vessels dilate. In ten minutes damp sheets and skin are of same temperature. Heat then accumulates on surface of body, and patient lies in medium warmer than ordinary clothing and the effect is soothing. If wet pack is continued several hours the skin excretes most actively, intra-organic oxidation is furthered, and the combustion of antitoxins is increased (Baruch).

Half-bath.—A tub containing enough water to reach above the pelvis; temperature 85° F. A cold damp towel is placed about the head. The attendant bathes the face and rubs the back with the left hand and with the right hand dashes water from a long-handled dipper over the shoulders of the patient. Patient rubs anterior

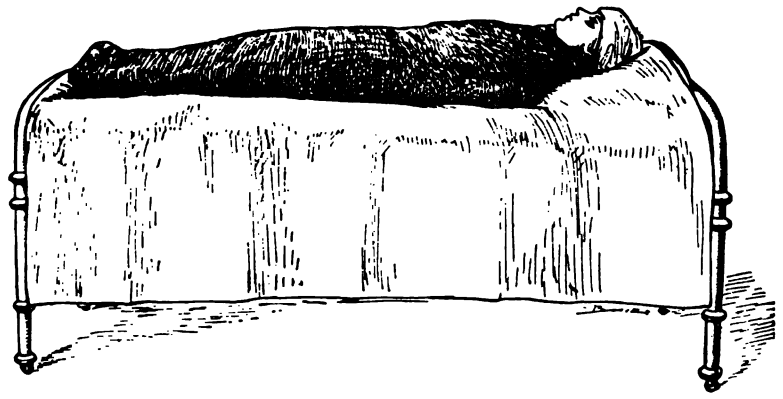

Fig. 114.—Wet pack, III.

part of the body with both hands. Cooler water is successively used until the patient feels cold. Renewed applications of water and renewed shocks by friction stimulate the peripheral nerves and dilate the vessels. There is no pressure excited by the volume of water as in a full bath, and dilatation of the surface vessels is promoted and friction is readily applied.

An objection is found in the fact that the feet are immersed in cold water and need friction to prevent a chill. The temperature is reduced with each bath eventually down to 70° F. This method

is of great value for reducing temperature, but has an important indication after the application of the wet pack. A modification of the half-bath after the wet pack consists of a tub, quarter full of water at a temperature of 90° to 85° F., actively set in motion by the hand of the patient and attendant. Duration six to eleven minutes, after which the patient is covered with a warm sheet and dried (Baruch).

THE ACTION OF WARM BATHS

A warm full bath causes an increase in the rapidity of the pulse, which persists after the bath. This occurs through its influence on the peripheral nerve-supply, which reflexly acts upon the vagus center, and which stimulates the accelerantes of the vagus. Very warm baths can, through weakening of the venous tonus, cause an increased resistance in the minor circulation, whereby, in spite of increased work on the part of the heart, no bettering of the circulation results. This is a weakening influence, since the heart is sufficient only when it is able to force the blood to the most distant organs, in whose capillaries alone tissue metabolism takes place. A very warm full bath causes usually no increased demand for nutrition and exerts no stimulating effect on the central nervous system.

A full bath of tepid or warm temperature, from 85° to 95° F., relieves congestion of the genital organs, eases pain, and is conducive to sleep and rests the patient. During a menstrual period it diminishes the loss of blood. It is valuable in the treatment of the congestion and nervous symptoms of the climacterium in spastic dysmenorrhea, sleeplessness, excitability, etc.

The vasomotor disturbances (flashes) of the climacterium are benefited by baths of a duration of fifteen to twenty minutes and of a temperature of 90° to 100° F. They diminish the blood-pressure.

Recently chlorosis and anemia have been treated with benefit by warm baths which add heat to the body, and which by withdrawing fluids from the body increase the thickness of the blood and increase the hemoglobin and the red blood-cells.

Full baths, lasting twenty minutes to one-half hour, are given

three times a week at a temperature of from 95° to 105° F., and are followed by a cool rubbing or douche. Combined with these baths, rest and iron are of importance.

THE NAUHEIM BATH

A full bath of water at a temperature less than that of the body exerts, first, a stimulating action of the central nervous system and upon the trophic centers. If, at the same time, it withdraws heat from the body, it increases the process of oxidation. A bath of fresh water may be given with benefit or comfort at any temperature which does not produce too great a shock, if it is followed by a normal reaction or by mechanical rubbing **which produces a reaction.** Such a reaction results in a change in blood-distribution, relieving the interior of the body of congestion, increasing the number of red cells in the circulating blood, increasing the tone of the heart, the vessels, and the tissues, and causing increased tissue metabolism, particularly through the stimulus given to the trophic central nervous system. Baths of a temperature less than that ordinarily borne with comfort may be made not only comfortable but still more valuable by the addition of chemical substances which exert a chemical stimulation upon the skin and the peripheral nerves.

The following objections may be raised also against cool and cold fresh-water baths:

1. A mechanical frottement of the skin during and after the bath is necessary to bring about a complete reaction.
2. Many patients cannot stand the first shock of the cold water.
3. The effect of the bath lasts but a short time.
4. The increased tissue metabolism is not so great as in other baths.

We can substitute for the thermal and mechanical stimuli chemical stimuli, and can likewise overcome the shock of the cold water, if the bath contain chemical ingredients which exert a frottement of the entire periphery. Through varying proportions of the chemical ingredients we can regulate the strength of the stimulus. We can, in a bath of indifferent temperature, without

shock in this way obtain the same and more lasting stimuli than by thermal means, and can cause by chemical combinations a more decided increase in the processes of oxidation. We are able by such baths to bring about a lasting protection and rest to the heart and an improved state of the circulation. An important element is the ability to bring about a decided and increased resorption of broken-down tissue products.

The addition of salt is one of the means of accomplishing this purpose. If five to ten pounds of salt be added to a full bath, such a bath can be taken at a lower temperature because of the chemical stimulation of the salt. An added advantage is the increased oxidation produced by the addition of the sodium chlorid, chemical tests having shown that oxidation is increased by this means. Zuntz found that in a 3 per cent. saline bath there was an increase of oxidation as compared with a fresh water bath, so that 15 per cent. more oxygen was used and 25 per cent. more CO_2 was given off. If to a bath containing salt, calcium chlorid in amounts varying from four to ten ounces be added, the baths can be taken at a still lower temperature, because the calcium chlorid by its peripheral chemical stimulation aids in the production of a reaction and brings the circulating blood still more actively to the surface of the body. Further chemical tests have shown that the addition of calcium chlorid to a bath has a marked action in increasing tissue metabolism, and that this action is exerted specifically in the breaking down of old tissues, such as the end-results of various inflammations, and, likewise, such as are included under rheumatic and gouty deposits.

Agents which, like the saline bath, bring about increased metabolism are: (1) Sea air, which, however, diminishes the amount of phosphoric acid excreted and stimulates the nervous system constantly without a decided or permanent effect upon the circulation. (2) Physical exercise, which, however, demands the increased use of energy, increases the amount of phosphoric acid excreted, and is decidedly contraindicated in inflammatory pelvic conditions.

Simple rest causes no increased tissue change, has constitutionally no effect on the general tone, rests the nervous system, but is accompanied by no stimulating action on the same.

If to a bath containing salt and calcium chlorid, carbonic acid

gas be added, we have what is called a Nauheim bath, *i. e.*, a carbonated saline bath.

A personal study of the baths at Nauheim, and an observation of their action in cardiac affections, showed the marked effect exerted by them in dilating the peripheral capillaries, in slowing the pulse-rate, in relieving the heart by bringing to the surface of the body blood so frequently stagnated in the various internal organs, and in producing an equal and even circulation throughout the various portions of the body. A further point of interest consisted in the observation of the marvelous action of the baths in cases of locomotor ataxia. I was privileged to observe several patients, at first totally unable to stand, who, after a course of these baths, were able to walk about, even though with the characteristic gait. In quoting the action of the baths in cardiac affections and in cases of locomotor ataxia, I simply call to mind the two essential advantages gained by their administration: (1) a strengthening of the heart and an equal distribution of the blood-supply to various parts of the body and to the periphery; (2) a most remarkable stimulation of the central nervous system and of the trophic centers.

My views were originally expressed in the "Medical Record" of November 24, 1900, in an article entitled "The Value of Carbonated Saline Baths in Gynecology." In part my opinion was stated as follows:

"We find in gynecologic practice a very large number of cases which, though the symptoms may be severe, deserve conservative treatment for the following reasons: (1) Because after a long treatment they may be considerably improved; (2) because their symptoms as local affections do not justify the risk of operative interference; (3) because the desire for future pregnancy is a justification for conservatism; (4) because the cases after acute inflammations are suited to conservative methods only; (5) because such methods are a valuable preliminary to subsequent operation; and, finally, (6) *because the local affection is very often only a part of a generally weakened asthenic physical state.*

"Among these conditions are included certain forms of metritis, parametritis, pelveo-peritonitis, salpingitis, hydrosalpinx, pyosalpinx, etc. A large proportion of cases have these affections to a slight degree, but combined with them are displacements of the

uterus and adnexa with chronic congestion or venous stasis in the pelvis, with reflex and constitutional symptoms; not infrequently ren mobilis, gastroptosis, and enteroptosis are found coexisting. These latter patients often possess a flabbiness and lack of elasticity which is by no means the result of the gynecologic condition, so that we are compelled to consider *the latter as part of a general state*. From the gynecologic standpoint we name this condition hysteroptosis."

"It was the frequency with which the cases of hysteroptosis came under my observation that influenced me to look to constitutional treatment for their relief in place of continued local applications for these symptoms, among which leukorrhea, pelvic looseness, and especially backache may be mentioned. The method which has the greatest and most rapid effect, and which in certain cases seems almost specific, is hydrotherapy, under which we understand both thermal and chemical stimuli. A study of the general action of thermal carbonated saline baths confirms me in the belief that we have in them an excellent method of treatment for such cases, especially to promote the resorption of exudates and inflammations, and for the relief of congestions. The results obtained in the treatment under my own direction in Abel's clinic, Berlin, of twenty-one selected cases, with various gynecologic ailments, amply justify the acceptance of this method, and future experience will suffice to fix the limitations and indications."

Much has been written of the action of the Nauheim baths in valvular cardiac affections and in myocarditis. Relatively little has been acknowledged of their value in rheumatism and gouty states, and almost nothing, to my knowledge, of their value in many perplexing conditions found in gynecology—conditions not open to surgical treatment, conditions very little benefited by our usual therapeutic measures. In studying the literature concerning Nauheim baths, I found that Beneke, in 1857, made most exhaustive investigations on patients whom he followed closely. He took into account the intake of food; he observed and made chemical analyses of the urinary excretion and of the excreta; he took into consideration variations produced by temperature, and the result of his observations showed that the baths exerted a most remarkable effect on tissue metabolism. He later established the value of the

baths in rheumatism and gouty diseases, claiming that joint exudations and inflammations were rapidly removed, and that valvular affections of the heart were prevented or reduced to a minimum if the baths were given shortly after an attack of acute rheumatism.

As I use it, a Nauheim bath consists of a tub full of water, containing sea-salt, calcium chlorid, and carbonic acid gas in varying proportions. The various springs at Nauheim contain these elements in different proportions. The baths are taken at a temperature varying from 95° to 80° F. The duration of the baths varies from eight to twenty minutes. The ease with which these baths may be arranged at home, in a sanitarium, or in a hospital, their splendid action in cases which, as said before, cannot be wholly benefited by operation, lead me to call especial attention to their therapeutic value.

The addition of carbonic acid gas to a bath is a most important factor, causing a dilatation of the peripheral capillaries and bringing the blood still more readily to the surface of the body, thus relieving congested areas and taking a strain off the cardiac muscle. A further and most important action of the carbonic acid gas is that to which Graüpner has called attention, viz., its reflex action upon the central nervous system, stimulating the various transmission fibers, and the trophic centers in the spinal cord. Some of the results of the Nauheim baths include:

1. A slowing of the pulse-rate.
2. An increased excretion of urine.
3. Increased oxidation.
4. Increased metabolism and a breaking-down of old tissues.
5. A regulation of the circulation and an even distribution of the blood through the various structures of the body.
6. Increased demand for nutrition.
7. Building up of healthy tissue.
8. Resorption of exudates.
9. The relief of congestion.
10. Stimulation of the nervous system and the trophic centers.

The baths should be taken under the observation of a physician, for changes in the strengths of the baths, in their temperature and in their duration, depend upon the reaction in the individual patient and upon the result which is to be produced. The effect

upon metabolism and tissue change is brought about, not through exertion or through the giving off of reserve energy, but through the channels of protection and tissue substitution. This regulated and altered tissue change goes on within a certain physiologic limit, which should not endanger or overtax the functional energies of the body. Over-stimulation is to be avoided, for it readily results in nervousness, sleeplessness, loss of appetite, and marked languor. Every bath should be followed by a sensation of exhilaration. There are patients who will stand these baths only when of the weakest form. Such patients are normally just about able to meet the usual demand of tissue change only by the greatest care in the one way of diet, air, and rest, and too great stimulation disturbs this delicate balance without producing any gain.

My first experience with the baths was made on a patient suffering from marked gonorrheal cellulitis, which so completely surrounded the pelvic structures that it was impossible to map out uterus, tubes, or ovaries. A course of twenty baths so relieved this exudation and inflammation that examination showed a freely movable uterus, and tubes and ovaries of the character of salpingitis or salpingo-oöphoritis. Twenty hospital cases were then treated by this method. One-half were of an inflammatory nature; the other half were cases in whom local pelvic relaxation, uterine displacements, as well as abdominal ptoses, were complicated in varying degrees by that complex of nervous symptoms to which the term neurasthenia is so readily applied. In the inflammatory cases the relief of congestion and inflammation was so noticeable as to be remarked on examinations made two or three times weekly. In the second class of cases there was a stimulation of the general nervous system, a marked exhilarating effect on the depressed physical and mental state, and a general trophic effect on the inelasticity so noticeably a part of these cases. Further observation of the effect of these baths on a series of over one hundred cases in private practice has served to still more firmly establish their value in my opinion, and I herewith mention the class of cases in which aid and benefit frequently may be obtained by the Nauheim bath.

1. The baths are of value in certain cases of insufficient development of the genitalia, associated with relative amenorrhea and with dysmenorrhea, especially if complicated by chlorotic symptoms.

The giving of iron and arsenic, as well as ovarin, is an added therapeutic measure of very great potency.

2. Uterine conditions associated with a lack of tonicity of the muscular and vascular structures, such as are found, for instance, with uterine catarrhs. The immediate effect can be recognized by the large amount of mucus discharged after a bath, which result is produced by the increased circulation and increased stimulation to contraction on the part of the uterus. Therefore the baths are of great value in cases of subinvolution, and in persistent hyperemia with or without an inflammatory etiology.

3. Cases of inflammatory metritis and subinvolution fibrosis may be benefited so long as no great interstitial hypertrophy has taken place. On the other hand, such cases as are associated during the climacterium with marked bleedings should be treated with care, since an increased blood-supply is liable to produce exacerbations of hemorrhage.

4. A large number of cases of sterility are due to a latent, very subacute salpingitis, sometimes with and often without closure of the abdominal end of the tube by cobweb peritoneal adhesions. We know that cases of salpingitis of that form in which the abdominal ends are not absolutely closed are cases which may be cured. That adhesions may be prevented and the organization of adhesions may be avoided by these baths, I believe to be well grounded theoretically, and to be proved practically. The Nauheim bath by promoting a normal pelvic circulation, by relieving congestion, by toning up the system generally, can cure such cases of salpingitis, and pregnancy may result. The edema of the tubal mucosa disappears and the cilia become active. The attainment of this desired end is aided by very conservative vaginal treatment of the cervix, of cervical catarrh, and of cervical erosions. Great stress is to be laid on the avoidance of intracervical and especially intrauterine treatment of any sort.

5. A very beneficial action is exerted by the baths in cases of inflammatory infiltrations of the pelvic connective tissue. Cases of cellulitis, particularly such as occur after labor or abortion, if treated before a sclerosis takes place are very much benefited by the administration of the baths. If the baths are given after the pelvic connective tissue is contracted and sclerosed, the benefit

is much less marked. In all inflammatory conditions, after the temperature has been reduced to the normal, with or without operative measures, the increased blood-supply and the relief of congestion aid the resistance of the patient in overcoming the remaining inflammatory elements, and tend to restoration to the normal with a minimum amount of injury.

6. An almost specific action of the baths is to be found in those cases of local pelvic subinvolution and in cases of general subinvolution so frequently associated with gastro-enteroptosis and movable kidney. These conditions are most frequently found in women who have borne children, but occasionally in certain women who are characterized by a general inelasticity, but who have not borne children. The baths increase the tonicity of the various ligaments related to these pelvic and abdominal ptoses. The baths produce an exhilaration temporarily and an increase in strength permanently.

Those cases complicated by hysteroptosis are decidedly benefited. The patients gain in strength and weight, the number of red blood-cells is greatly increased, appetite improves, and a feeling of strength and exhilaration results, such as no treatment can accomplish in the same time. In addition, the local symptoms and, what is more important, the idea that a diseased local state exists, disappear. Here, too, the addition of iron, arsenic, and ovarin is a valuable therapeutic adjunct.

7. There are numerous cases in whom it is desirable before operation to restore to the normal the circulation in the pelvis and to reduce to the greatest possible degree the amount of associated exudation. I refer to cases of pyosalpinx, and especially to cases of salpingitis. Here a course of baths given before the operation aids permanent convalescence of the patient and has a tendency to prevent the occurrence of further adhesions. In other cases a course of baths administered after the operation furthers the convalescence and aids in the resorption of those stump exudates which so frequently mar the permanent valuable results of the operative procedure.

8. An unrecognized but most valuable field for the administration of the baths is found in the post-partum treatment of women. In my own practice, so soon as mothers are able to walk about, at

some period in the third week, a course of these baths is given to aid the involution of the pelvic organs, to assist in the restoration of pelvic and general tonicity, to stimulate the nervous system, and to aid the secretory function of the breasts. I am sure that with this aid patients suffer less from loose abdominal walls, acquired displacements of the uterus, hysteroptosis, and physical and mental asthenia. I find that patients at the end of five to six weeks are almost restored to their normal previous condition of elasticity and well-being.

9. Certain cases of obesity, especially such as are accompanied by a diminution in their regular menstrual flow, are benefited by a course of these baths. Not infrequently the patients lose weight, especially on a diet rich in nitrogenous elements and poor in the starchy components: Here, again, the addition of iron, arsenic, and ovarin aids in the desired result.

10. A further and most valuable field for the use of the baths is to be found in the treatment of neurasthenic states, and especially those noted in the climacteric period. Here the nervous accompaniments of the "change of life" are often a source of annoyance and misery to the patient and her family. In those cases not complicated by climacteric hemorrhages, I am most enthusiastic about the results to be gained by a course of Nauheim baths. The asthenic physical condition, the mental depression, the irritability, the nervousness, and especially the sleeplessness, are often relieved to a great extent by a judicious use of these carbonated saline baths. If with the baths a thorough course of massage is given, and if at the same time ovarin is administered, with or without iron and arsenic, the results in many instances are nothing short of astounding.

11. Though not strictly in the field of gynecology, I must again mention the valuable action of the Nauheim bath in many cases of rheumatism and gout. Many gynecologic patients suffer from such states, and have gouty or rheumatic nodules in various parts of the body, causing severe pain in various nerves, and causing attacks of marked occipital headache and pain along the vertebra, often associated with mild or severe attacks of migraine or pseudo-migraine. Here Nauheim baths plus massage or the nodules are often productive of marked relief from the annoyances of this diathesis.

These classes comprise, as can be seen, instances of almost daily occurrence in general as well as in gynecologic practice.

Among them are cases which operation does not benefit. Among them are cases in which local and general therapy often fail us. There are other cases which frequently seek relief at the hands of the neurologist. Many of the latter class, however, evidence symptoms which occur in women because they are women; *i. e.*, they are cases suffering from symptoms related in a greater or lesser degree to the specific functions of the genital organs, and as such are strictly gynecologic in their nature.

Baths when begun contain 3 to 5 pounds of sea-salt, 2 to 4 ounces calcium chlorid, and ½ box of Triton salts. In sensitive cases the Triton salts, which furnish the carbonic acid gas, are omitted from the first few baths. The water is of a temperature of 95° F. and the duration of the bath is eight minutes. The patient lies quietly in the bath. Difficulty in breathing is often noted for the first minute or two. At the expiration of the stated time the body is dried gently, preferably with warm towels, and the patient then lies down in bed for one hour, first taking a cup of hot milk or weak tea. At the expiration of this hour the patient may resume her daily vocation, being careful to avoid great exertion of any sort. Baths are best taken in the morning, at least two hours after a meal. The baths are taken three days in succession; then comes an interval day on which no bath is taken; then three more baths are taken; then comes another interval day, and so on until about twenty baths have been administered. No baths, of course, are given during menstruation. Each set of three baths is made a little stronger by the addition of a little more salt, a little more calcium chlorid, and more of the Triton salts, but only if patients stand the baths well. The last three to six baths contain 8 to 10 pounds of sea-salt, 8 to 10 ounces of calcium chlorid, one box and a half of Triton salts. The temperature by this time has been reduced to 85° F. and in some instances to 80°. The lowering of the temperature depends upon the manner in which the patient bears the change in temperature. No patient should leave the bath feeling cold or chilly. The slight sense of chill noted on getting into bed after a bath disappears on drinking the hot milk or tea. The last baths should have a duration of eighteen to twenty minutes. The beneficial effects of these baths are very much enhanced by a subsequent change of air for from

two to four weeks at an altitude of 1000 to 2000 feet. In almost all cases, and especially in cardiac cases, the routine administration of digalen for several weeks after a course of baths produces an extremely beneficial tonic effect.

A modification of these baths can be used in cases in which the effect desired is purely pelvic, as in mild subacute inflammations and in cases in which the full bath is not feasible through lack of accommodation or where the expense of the full baths cannot be borne. I refer to sitz-baths which contain enough water to cover the pelvis up to the umbilicus when the patient is in a sitting position. Such a bath, containing 3 to 5 pounds of sea-salt and 3 to 6 ounces of calcium chlorid, at temperatures from 95° down to 85° F., and of a duration of ten to twenty minutes, is followed by very good results in the way of influencing the pelvic circulation and relieving congestion and the slighter degrees of pain. The condition of patients should be noted during a course of baths. Too much stimulation by the carbonic acid gas may cause palpitation, restlessness, and weakness. The baths should then be stopped for a few days, and on their renewal should be begun of a less strong character as concerns all the ingredients used or should be given every other day. Nervous individuals must be given graded treatment, and in these, as in anemic cases, progress must be made slowly, for, as Graüpner says, these are cases in which the entire energy of the body is consumed in preserving a balance between nutrition and the force used in the performance of the most necessary body functions, so that the slightest degree of overstimulation is injurious.

I believe that the results obtained justify me in claiming for the carbonated saline baths a power of resorption too valuable to be underestimated. The method, in addition, benefits the general state to a decided degree and increases the natural and effective functions of the body, tones up those pelvic structures which depend so decidedly for their elasticity and blood-supply on the condition of the circulatory system and of the body in general, stimulates the central nervous system and the trophic centers, and produces both temporarily and permanently a state of exhilaration and well-being.

Marked arteriosclerosis, and nephritis are considered contraindications.

INTERNAL SECRETIONS

PINEAL GLAND

Total destruction of the pineal gland by malignant tumor results in profound cachexia with trophic derangement (decubitus). Pineal tumor results in obesity but not genital atrophy. Pineal obesity is probably due to hyperfunction, but this is not certain, because obesity is observed in pineal disease where there is certainly a reduction of secretion. Pineal tumor, generally teratoma in boys of under seven years, produces abnormal growth in height, abnormal growth of hair, premature development of the genitalia and of sexual instinct,and mental precocity. In these cases the changes were associated with a diminution of the pineal tissue. During the period of the complete development of the pineal gland—that is, until the seventh year—this organ normally exerts an inhibitory influence upon the development of the sexual glands, and probably has a secondary effect on mental development. Destruction of the pineal gland at this stage leads to mental and physical precocity. There is an antagonism between pineal gland and hypophysis, for pituitary insufficiency causes hypogenitalism. It appears that in adult animals the pineal gland is of no consequence.

The pineal gland shows its chief functional activity in childhood; a significant involution of the structure occurs at puberty. Pineal enlargement, whether associated with hyperplasia or hypoplasia, may produce a tendency toward adiposity. Certain types of pineal tumor are characterized by extraordinary precocious puberty. According to Frankl-Hochwart, "when in a young individual (boy) there is increase in stature and unaccustomed growth of hair, obesity, drowsiness, a premature genital and sexual development, with evidence of precocity of adolescence, pineal tumor must be thought of."

THYMUS

When the thymus is removed in dogs they die in a year. After a fourteen-day period of latency, they become for the next two or three months of a spongy appearance, are easily tired, have a peculiar walk, show apathy, a diminished intelligence, and a most unusual hunger (stadium adipositatis). This passes over into the terminal cachectic stage, which lasts three to six months. In spite of their hunger they are more unsteady, show attacks of muscular tremor, lose their hair, and become gradually idiotic. Finally, they die in a comatose stage. Through removal of the spleen the cachexia comes on more quickly. Klose says that the symptoms after removal of the thymus are due to a poisoning by phosphorus. If the thymus is removed in the early weeks of a dog's life there are decided changes in the bone through diminished calcification. They grow more slowly, have weakness of the muscles, become easily tired; fractures heal slowly, the extremities are bent, and there is an increased loss of calcium.

The thymus begins to regress at puberty. This alone points toward the connection of the thymus with the genitalia. Individuals with hypoplastic ovaries retain the thymus longer than normal. In this form of status thymicus there is a question whether the thymus is in direct relation with the genitalia or whether both are not a symptom of a slow development. Castration, after puberty has begun, causes an increase in size of the thymus. According to Hammar, the hyperplasia of the thymus after castration is not compensatory, but Hammar believes that the ovaries and adrenals are thymus depressors, while the thyroids (and possibly hypophysis and parathyroids) are exciters of the thymus.

Blundel considers chlorosis an auto-intoxication by products of metabolism, which in childhood are destroyed by the thymus and in the later years by the ovaries. If the thymus stops its action at a too early age, and the ovary begins its work too late, then in the interval the organism is poisoned. Blundel has had excellent results with preparations of thymus. Novak is skeptical about this theory. Status thymicus (sudden death by laryngospasm) is often associated with a large thymus, and

formerly this sudden death was attributed to thymic asthma, but in sudden death in status lymphaticus there is no narrowing or closure of the trachea. The condition is really due to primary heart-failure. In these cases there is a general enlargement of the lymph glands, of the tonsils, of the follicles at the base of the tongue and in the intestines, enlargement of the spleen, large thymus, narrow aorta, large, soft, pale heart. These patients stand narcosis poorly and have a deficient development of the "chromaffine system." It becomes easily tired, this important system does, at least in cases of sudden death. Death occurs by sudden exitus in individuals who have the not infrequent combination of Basedow's disease and status thymicus. Individuals with a lymphatic-chlorotic constitution show a remarkably slight resistance toward infectious diseases. The diagnosis in certain cases concerns individuals with a pasty look, enlarged glands of the neck, hyperplasia of the tonsils, hypertrophy of the left ventricle, enlarged spleen, and a tendency to eczema. In collapse the only treatment consists of intracardial injection of adrenalin. This is the ideal treatment for producing heart excitation and also in eventual collapse of the chromaffine system.

After a short period of development, until about the second year of life, retrogressive changes occur in the thymus. Involution coincides normally with adolescence. There may, however, be the so-called persistent thymus. Removal of the sexual glands of rabbits is followed by hypertrophy of the thymus. If thymectomy is performed on guinea-pigs before puberty there results a rapid development of the ovaries. The thymus probably exercises an inhibitory influence upon the development of the ovaries, and involution of the thymus is consequent upon the maturity of the sexual glands. In thymectomized animals the long bones take longer to develop, calcification progresses slowly, and this causes retardation of growth, softness of bones, and imperfect apposition of the periosteal bony layers after fracture.

"The thymus gland is an organ of vital importance. Extirpation at the height of its development results finally in death. Most probably its most important function consists in binding

acids, thus removing injurious substances from the blood. This supposed function gives us an explanation for the disturbances occurring in the calcium metabolism after extirpation of the organ, for the changes in bone and in the central nervous system. The thymus gland occupies a dominating position over the lymphatic apparatus. Between the thymus, on the one hand, and the organs of internal secretion on the other, complex relations exist. This is especially true of the spleen. This organ is, so to speak, 'prepared' by the thymus to take up some of the latter organs's still unexplained functions after involution" (Lampe).

There seems to be a close relationship between the thymus and thyroid. The symptoms of exophthalmic goiter are due to either an excess or perverted secretion of the thyroid. The primary disturbance exists in the thymus, the action of the thyroid being that of a "multiplicator," according to the theory of von Mikulicz. According to the theory of Hart, Basedow's disease is to be attributed rather to hyperthymisation than to hyperthyroidism.

PARATHYROIDS

Removing the parathyroids produces tetany. Experiments on pregnant dogs show that removal of the parathyroids causes tetany. The important symptoms consist of attacks of tonic, painful contractions or cramps, especially in the extremities. Associated changes are trophic disturbances, especially changes in ectodermal structures, such as loss of the hair, brittleness of the nails, the formation of cataract, anomalies of the teeth, looseness of teeth.

The parathyroids in pregnancy show hyperemia and evidences of increased activity. Tetany in the pregnant parturient and nursing woman does occur. Cases of maternity tetany are characterized by the severity of the attacks, the spreading of the attacks to many groups of muscles, and the very intense pain. The attacks do not last long. Neumann was the first who showed that the attacks may be started by uterine contractions. Attacks may occur during curettage, whether the patient be pregnant or not; that is during simple curettage or curettage for abortion. It may be stated that in all cases of

tetany which occurs in pregnancy there are changes in the parathyroids, the cause of which dates back a long time. Since in many cases evidences of the failure of parathyroid secretion first become manifest during pregnancy, it is probable that pregnancy makes increased demands on these structures. What is known as regards the etiology may be summed up in the observation that certain classes, such as tailors and shoemakers, are especially liable.

Tetany of the pregnant woman exerts an unfavorable influence on the fetus. As a general rule, gravidity tetany is a severe illness. In severe cases of tetany in pregnancy the condition should be interrupted. Tetany has a tendency to recur, and Frankl-Hochwart believes that future pregnancy should be prohibited.

The parathyroids have been said to stand in relation to eclampsia and osteomalacia. The clinical picture of eclampsia is so absolutely different from that of tetany that an etiologic connection seems impossible. On the other hand, it is possible that the parathyroids stand in relation to osteomalacia. Just in what way these bodies act upon the calcium metabolism is not known, but their influence upon the calcium deposits in bone and teeth is not to be denied. It must be recalled that attacks of tetany may be followed by loss of hair and the nails. (In the course of the tetanic attacks ergotin and chloroform should not be used.) Erdheim found in 6 cases of osteomalacia evidences of a hyperfunction of these organs. He does not consider the changes in the parathyroids to be the cause, but only a symptom of osteomalacia. In unison with this opinion may be cited the cases where osteomalacia and tetany occur at the same time (Joseph Novak).

Partial removal of the parathyroids in carnivoræ always shows more or less severe symptoms of tetany which later disappear. If, after partial removal of the parathyroids, no symptoms appear, the animal is in the condition known as *latent tetany*. Such animals as appear sound after removal of two or three parathyroids are attacked by tetany when they become pregnant, or if injected with placental extract. In other words, a metabolic derangement causes the symptoms of tetany to

appear where they were previously latent. Every acute tetany is accompanied, in addition to the nervous symptoms, by secondary signs, such as shaggy appearance of the coat, falling of the hair, eczema, and extreme emaciation.

The acute nervous symptoms coming on after removal of the thyroid occur only where the parathyroids are also removed. This condition, known as tetany (characteristic muscular convulsions), is due to suppression of the function of the parathyroids, and is called tetania parathyropriva. Milder forms exist and also a latent tetany characterized by hypersensibility of the nerves, a state occurring frequently after partial removal of the parathyroids.

Cases of thyroidectomy in the human being occasionally have latent tetany, because, when pregnant, tetany develops. There is another form, known as maternity tetany. Tetany is also seen in infants. There is an intimate relationship between tetany and menstruation, pregnancy and lactation. Partial removal of the parathyroids in animals, as stated above, may be followed by a tetany provoked by pregnancy or lactation. The teeth of people who have had infantile tetany show hypoplasia of the enamel. The parathyroids frequently become tuberculous, and the Chvostek phenomenon in tuberculosis patients is frequent. *Myasthenia gravis* comes from increased function of the parathyroids. *Paralysis agitans* comes from too little parathyroids. These glands are supposed to maintain the balance of neuromuscular activity. Myasthenia and tetany are diametrically opposed, according to Chvostek. Tetany is produced by hypofunction, while myasthenia is produced by hyperfunction.

A parathyroid gland may be implanted into the abdominal rectus muscle. Parathyroidin seems to have little effect. The parathyroid extract of Berkeley of New York by mouth or needle is said to stop the symptoms of tetany. The extract of parathyroid glands increases intestinal peristalsis and the muscular contractions of the uterus and increases diuresis. According to Kocher, the energetic use of thyroid extract and of iodothyrin in large doses abates the symptoms of postoperative tetany, and when continued stops the attacks. In postoperative tetany

the improvement is immediate after hypodermic injection of soluble thyroid extract. It is not probable that enough parathyroid substance is present in the extract of the thyroid glands to account for this effect. There are numerous accounts of the favorable effects of thyroid gland extracts in the parathyroid tetany of animals.

There is a relationship between the thyroid and the parathyroid. After removing the parathyroids, the thyroid often hypertrophies. Thyroid treatment acts well in parathyroid tetany. There is parathyroid hypertrophy after removal of the thyroid. These three facts speak for a relationship. The hypertrophy of one group, after removal of the other, may be regarded as compensatory. Possibly a vicarious activity of the thyroid and parathyroids may be assumed. Rudinger believes the thyroid and parathyroid to be antagonistic. He believes that the function of one gland is controlled by the other, and that when this balance is disturbed by the removal of one the other one hypertrophies. The giving of parathyroid glands was followed by bad symptoms in myxedema, but good symptoms resulted in Graves' disease. Rudinger believes that the hyperfunction of the thyroid in Graves' disease is restrained by giving *parathyroid glands*, while in myxedema, the hypofunction is intensified. He believes that the thyroid secretion stimulates the sympathetic nerve. Removing the parathyroids, which are the inhibitory agent, increases the sensibility of the sympathetic nerve. The most important point in favor of the theory of antagonism is provided by the hypertrophy of one gland when the other is removed. Parathyroid tetany may be due to a toxic product of metabolism or to the presence of a toxin. In tetany of children there is a scarcity of calcium in the organism of children. MacCallum found that giving a 5 per cent. solution of calcium acetate and calcium lactate by mouth, or hypodermically or intravenous, to dogs from which the parathyroids had been removed, stopped the tetanic symptoms for twenty-four hours. The parathyroid glands possibly control the calcium metabolism. Calcium salts exercise an inhibitory effect upon pathologic muscular convulsions (Biedl).

The parathyroids have much to do with the absorption and

excretion of the mineral salts of the body, and are important, therefore, to the nervous system and the bone. Interference with their function causes a decreased resistance to infections. If the parathyroids are injured, lactate of calcium and the feeding of parathyroid, or transplantation of parathyroid, are necessary. One-sixth of all the thyroid cells are sufficient for body needs, and one normal parathyroid, instead of the four, suffices.

THYROID

The secretion of the thyroid gland is an iodized albuminoid which modifies the activity of distant organs (hormone). By increasing normal function it affects the metabolic processes, cardiac activity, some portions of the sympathetic system, the hypophysis, the suprarenals. It also inhibits function. Instances of its activity are the promotion of skeletal growth, the development of the sexual glands. The limitation of the internal secretory function of the pancreas is an evidence of its inhibitory power.

The arrest of growth in removal of the thyroid in animals is due to a retardation of the process of ossification, both of the epiphyses and of the synchondroses. In the internal organs there results an enlargement of the glandular portion of the hypophysis. In addition to the difference in skeletal growth, there is general apathy and atheromatous degeneration of the aorta. There is infantilism, imperfect activity of the sexual glands, and general torpor. The animals weigh one-third as much only as they should. The arrest in the growth of the skeleton and the development of the sexual organs is the typical and invariable result of the absence of the thyroid function in carnivoræ and herbivoræ. In older animals the changes are less marked, removal causing loss of appetite, sluggish digestion, increased emaciation, and finally cachexia thyreopriva. There is apathy, trophic disturbances of the cuticle, falling of the hair, dryness of the skin, and eczema. The number of red blood-cells and the hemoglobin are decreased, but there is an increasing leukocytosis. The typical and invariable result of the suppression of the thyroid function in adult animals is a

progressive emaciation, which increases to profound cachexia and culminates in death. The most characteristic post-mortem finding is the enlargement of the hypophysis (Biedl).

The same changes occur in human beings after removal of the entire thyroid. This is the so-called *cachexia-strumipriva*. A further symptom of this cachexia is a diminution of the mental energy, of the energy for work, and a typical edematous swelling of the skin.

Lack of secretion of the thyroid in infancy produces failure of growth and development, both mental and physical. The thyroid is a necessary element in promoting growth in childhood and in controlling the development of the body and mind. It rouses mental activity and is a cerebral stimulant. It aids nitrogen metabolism. It is essential in its relation to other secretions in providing genital development.

In *congenital myxedema* there is a decided inhibition of growth. There is obstinate obstipation, psychic disturbances, and a marked inhibiting effect on the sexual organs. In congenital absence of the thyroid and in the infantile cases of atrophy of the thyroid, which atrophy develops in the fifth and sixth years, the large majority of the cases are found in female children.

In *cretinism* the genitalia remain of the infantile type. The secondary sexual characteristics, such as the breasts and the hairing of the mons veneris, are very slightly developed. Myxedema in adults is more frequent than infantile myxedema. Myxedema, cretinism, cachexia strumipriva are all allied conditions.

The thyroid gland is very active at puberty, and begins to regress at the so-called climacteric period. In old age the thyroid becomes atrophic. The falling of the hair, the dropping of the teeth, and dry and wrinkled skin, the lowered temperature, diminished perspiration, indolent indigestion, and consequent emaciation, reduced metabolism, and consequent deposit of fat, followed by emaciation, decrease of mental power, and the diminution of the activity of the entire nervous system, these are all symptoms which characterize *chronic myxedema*.

Too little thyroid is responsible for some cases of slow growth in children, for eczema, some cases of asthma, perhaps amenor-

rhea, disturbances of digestion, states of depression and of melancholia, myxedema, etc., also the dry eczema, and itching of the menopause and of old age.

A frequent type of hypothyroidism is that associated with weight. There are scanty or absent menstruations, deposit of fat, drowsiness, slow pulse, dry skin, puffiness of the body, puffiness under the eyes, the type that I have called phlegmatic.

Under the title of "Chronic Benign Hypothyroidism" is grouped a combination of symptoms, such as loss of hair, diminution of the perspiration, changes in the skin, metrorrhagia. Other cases show backache, especially in the morning, without evident changes in the genital organs, and also metrorrhagia. Kocker lays stress on this backache as due to hypothyroidism.

Many cases of hypothyroidism are psychopathic, and, as the thyroid is influenced by mental stimulation and mental depression, mental treatment is of value.

Hyposecretion of the thyroid may cause mental depression, from simple apathy to real melancholia.

Neurotic symptoms are often suggestive of myxedema and curable by thyroid. In myxedema patients are depressed almost to the verge of melancholy without the self-accusation and despair of true melancholia. They are sluggish in their thought, unable to remember recent events, indifferent to their surroundings, without interest in personal and family affairs. They take an unfavorable view of their own condition, their will power is impaired. There is a mental inertia, they are inclined to be sleepy, and often sleep heavily both day and night and awake without any sense of refreshment (Starr).

Physically there is a dryness of the skin and hair, the skin does not perspire. It becomes pigmented, the hair falls out or becomes gray. The surface of the body is cold, the hands and feet are always cold. Appetite and digestion are impaired. There is an interference with the calcium metabolism. There is a progressive gain in weight. There may be constant pain in the muscles and bones. (Levi of Paris says that in many cases of "chronic rheumatism" thyroid treatment is the best.) When nervous or neurasthenic patients complain of such symptoms, one grain of thyroid twice a day added to the other treatment is

of value. In ten days the effect should be evident in less dryness of the skin, in relief from the sensation of cold, and in the decided improvement of mental activity.

Mental sluggishness in young girls, with symptoms resembling dementia præcox, and considered as cases of weakmindedness, may obtain mental activity by taking thyroid. The symptoms are not enough to warrant the diagnosis of myxedema, but the dry, scaly skin, dryness of the hair, and coldness of the body suggests the use of thyroid extract.

In **hyperthyroidism** we have a transient or continuous oversecretion. If this occurs, and the body cannot neutralize or destroy it, then toxic annoyances of various degrees occur.

Congestive goiter shows an overfilling of the blood-vessels and occurs during menstruation or pregnancy, because of the intimate relation which exists between the thyroid and the ovaries. Retained secretion means simple goiter. A hyperplasia and an increase of cells in the parenchyma mean over-activity.

There is a close relation between the ovaries, uterus, and thyroid, hence the goiter of adolescence and of pregnancy. In the climacterium this relation causes changes in the thyroid from hyperthyroidism to hypothyroidism.

The relation of the thyroid to the ovary sensitizes the thyroid gland. This, coupled with the various changes in balance which occur at puberty, menstruation, etc., is responsible for the instability which produces those various nerve phenomena due to hypersecretion or hyposecretion, or variations between the two, which make women the weaker sex.

The comparative frequency with which Graves' disease occurs in persons with status thymicolymphaticus is probably something more than coincidence. On the one hand, therefore, hyperthyroidism leaves, as in Graves' disease, changes in the functions of the ovaries. On the other, primary changes in activity of the sexual glands may exercise a secondary influence upon the thyroid, and as a result symptoms resembling those of Graves' disease are produced. (Page 413.)

Symptoms resembling those of Graves' disease may be associated with various conditions, as chlorosis, pseudochlorosis (swelling of the thyroid, increased cardiac activity, mental ex-

citement, fatigue, pallor, without chlorotic changes in the blood). Symptoms resembling Graves' disease are often seen at the climacterium. *The remarkable incidence of Graves' disease in women, and the frequency with which its occurrence is associated with functional change of the sexual glands, are factors of significance.*

There may be paroxysmal attacks of hyperthyroidism resembling very mild attacks of parathyroid tetany. Attacks may be associated with weakness, dizziness, blueness, very rapid and feeble pulse, and symptoms resembling collapse. Patients appear very sick, There may be associated diarrhea and uncontrolled movements of the hands and extremities. These attacks may come on during nursing, or after fatigue or irritations of various sorts. Such patients, aside from these attacks, have a marked tendency to premenstrual annoyances of the type resembling hyperthyroid symptoms.

Wolfsohn shows that extensive analogies exist between hyperthyreosis and anaphylaxis. Recent studies are tending to show more and more a correspondence in the blood pictures of the two conditions. "At least four points of concordance are noted—viz., leucopenia, mononucleosis, eosinophilia, and delayed coagulability. Other points of resemblance are seen in vasomotor excitability, dermographism, urticaria, and transient edema; outbreaks of sweating, bulimia, vomiting, and diarrhea, anxiety, hot flushes, tremor, pareses, convulsions, cardiac palpitation, tachycardia, asthma-like attacks, and hemorrhages of the mucosæ. The conclusion seems inevitable, that hyperthyreosis is an anaphylaxis. Graves' disease of the thyroid, whatever it is, results in the production of a heterologous albumin. Conversely, in anaphylaxis of exogenous origin, there should be a hyperfunctioning of the thyroid and perhaps of other glands of internal secretion. This can be almost mathematically shown in iodin anaphylaxis, which results in thyreosis. Iodin anaphylaxis does not result if the thyroid is able to detoxicate this substance. In endogenous anaphylaxis from hyperthyreosis it is probably the iodized albumin which behaves as a heterologous albumin! In Graves' disease this iodized albumin is produced in excess."

Hyperthyroidism is either an excess of thyroid or a dysthyroidism, and this question is not settled yet. Basedow's disease may be an intoxication by iodin, on the theory that the thyroid takes iodin out of the body and stores it up as iodothyrin. In most cases there are evidences of hyperplasia in the gland, yet the condition may often be one of perverted function rather than over-secretion.

In all cases of hyperthyroidism the pulse-rate and the heart action are practically increased. I scarcely ever make such a diagnosis without it. While tachycardia may occur with hypothyroidism also, I usually rely on a slow pulse for that diagnosis.

The vasomotor changes of hyperthyroidism produce a sense of warmth which is relieved subjectively in cold weather. On the other hand, a marked sensitiveness to cold speaks for hypothyroidism.

All changes, from mild depression or exaltation to melancholia and dementia, may be seen in hyperthyroidism, but the milder forms resembling neurasthenia are the most frequent; disorders of sleep, up to severe insomnia, are present in almost half of the cases of hyperthyroidism. Tremor is usually present in hyperthyroidism. Exophthalmos is not due to the hyperthyroidism, but to the irritation of the adrenals produced by the thyroid affection. In Basedow's disease there is generally an increase of mononuclear cells. Berry states that exophthalmos is due to accumulation of fat in the orbit.

The relationship between morbus Basedow's disease and the female sexual sphere is indicated by the frequency with which this disease develops during the sexually active years. Amenorrhea is considered a frequent, even if not constant, symptom of the disease. The ability to conceive is decidedly diminished. The disease is, as a rule, unfavorably influenced by pregnancy.

The thyroid undersecretes in many cases at first, producing perhaps physical weakness, tendency to fatigue, diminished sweating, loss of hair. It is possible that such evidences of diminished thyroid function, associated in some cases with muscular and joint pains, may precede or end in or complicate a change from hypofunction to hyperfunction. Involvement of the thyroid

may be due to tuberculosis, tonsillitis, influenza, typhoid, lues, staphylococcus infections, etc. In other words, a lesion produced in the thyroid and resulting in lowered energy of the gland in part, leads to an attempt at compensation, and results in symptoms quite different from the early ones of depression. This view of hypothyroidism, associated with the early stages of hyperthyroidism, may account for the improvement obtained by thyroid treatment or by the use of iodin in cases of apparent hyperthyroidism (Dock).

Simple goiter may develop into Basedow's disease through the use of iodids or iodothyrin, through the influence of puberty, pregnancy, menopause, and other strains. Basedow's may degenerate into true myxedema. Sometimes symptoms of Basedow's disease and of myxedema may exist together. This means that the greater part of the gland is inactive, and that what remains secretes an abnormal product, producing intoxication.

Basedow's disease seems to have a tendency to be transmitted to posterity, and in families of such patients there is a tendency to neuroses, psychoses, and diabetes.

Neurotic Symptoms of Hyperthyroidism.—There is nervous excitability, very active mentality, tremor, muscular irritability, and quickness of thought. Excessive function of the thyroid, not sufficient to produce exophthalmos or goiter, or a very rapid pulse, may produce symptoms of a nervous character simulating or complicating neurasthenia.

Certain neurasthenics are restless and cannot keep quiet, find it impossible to lie down or rest, are unable to keep their minds on any one subject for any length of time. They realize that the train of thought is unusual, and they fear insanity. They have a sense of heat in the body, a desire for cool air and fresh air, a burning sensation, which leads them to sleep with light bed-clothing, and very frequently leads to perspiration; the desire for cool air prevents them from going to the theatre or church or remaining in hot rooms.

The skin is shiny and moist, the hair is moist and glossy, and the patients are usually thin. There is tremor about the hands and exaggerated knee-jerks, are subject to diarrhea, menstrua-

tion is altered, sleep badly, complain of sudden flashes of heat, pulse between 80 and 90.

When these conditions are present in a case of neurasthenia the thyroid gland is probably over-acting (Starr).

Thyroidectomy in animals does not produce glycosuria. Adrenalin injections, which in normal animals provoke extreme glycosuria together with an increased metabolism of albumin in the fasting state, do not produce glycosuria in thyroidectomized animals, even when sugar is given at the same time. Adrenalin produces in dogs, from which both thyroid and parathyroid have been removed, a marked glycosuria, more so than in normal animals. The effect upon metabolism of the suppression of parathyroid function is the reverse of that produced by the suppression of the thyroid, for, in true athyreosis, the assimilation of sugar is increased and the use of adrenalin is not followed by glycosuria.

The relationship between the thyroid and the metabolism of the carbohydrates suggests that this relation depends upon the pancreas. The thyroid is believed to promote the activity of the chromaffine (adrenal) system and to inhibit that of the pancreas. The direct results of thyroidectomy consist in reduction of the metabolism of albumin, fat, and salt. The indirect results include a hyperactivity of the pancreas, due to the removal of the inhibitory agent. The thyroid, the chromaffine system, and the infundibular portion of the hypophysis accelerate the process of metabolism. The pancreas and the parathyroids retard metabolism. There is a normal balance between the two, as a rule.

If thyroid extract or iodothyrin are given continuously for two or three weeks, the amount of CO_2 excretion will be increased 20 per cent. Thyroid extract has the effect of increasing the capacity for nervous reaction and giving greater energy to phlegmatic people. It reduces constitutional obesity, but not obesity due to overfeeding (Biedl).

The flooding of the organism with thyroid substances exercises an elective stimulating effect upon the sympathetic, and it also influences the activity of those other internal secretory organs which have functional interrelationship with the thyroid

(thymus, hypothysis, suprarenals, ovaries). Amenorrhea is sometimes benefited by thyroid, especially if there are other symptoms of insufficient thyroid secretion, such as weight and dryness of the skin. Administration of thyroid is supposed to stimulate bleeding by causing a dilatation of the blood-vessels, especially in the uterus and nose (Osborne), yet, on the other hand, the giving of thyroid helps the bleeding, especially in hemophilia.

It is said by some that insufficiency of the thyroid may cause hemorrhage, and, on the other hand it is claimed that too much of its secretion may cause hemorrhage. Too much thyroid increases the coagulation time of the blood. Too little thyroid diminishes the coagulation time of the blood.

We should not forget that cases which simulate Bright's disease may be simply cases which need thyroid.

Thyroid is often given in too large doses. One should rarely begin with more than one-quarter of a grain three times a day. And five grains three times a day should be a maximum dose, and then only in pronounced myxedema after several weeks. Many patients can only stand one-twentieth of a grain.

In rheumatism and allied states one-tenth of a grain, three times a day, is a prophylactic dose, and one-quarter of a grain three times a day is a therapeutic dose. These very small doses are sometimes of value in chorea.

Thyroid is valuable in menorrhagia and in renal and intestinal hemorrhage.

The huge number of cases of hyperthyroidism are transient, and recover readily with appropriate medication and treatment. Change of climate, rest, administration of various gland extracts, etc., are of value.

The nervous symptoms include excitability a change of habits, and taste. There may be glycosuria, pigmentation of the skin, sweating, and vasomotor instability of the skin. There may be a fidgety and nervous manner.

Physical or mental strain should be avoided. Rest in bed for a few weeks is advisable, on account of the tachycardia or muscular weakness or the nervous irritability and the other symptoms.

The various emotions rouse the thyroid to activity. The same is true of the sexual sphere and of the various diseases of the genitalia. Arsenic, the iodids, coffee, tea, and alcohol, and the salicylates stimulate the thyroid.

The thyroid is quieted by rest and quiet, freedom from sexual relations, and correction of pelvic annoyances. A milk diet and glycerophosphates, belladonna, hydrastis, bromids, chloral, and especially opium and ergot.

We may use ovarin, extracts of the pituitary gland, thymus, and suprarenal. Thyroid should be contraindicated. Antithyroidin is sometimes valuable. It is a serum given internally in doses of ½ to 15 gm. a day. Intermittent treatment is advisable. It may be given subcutaneously, 1 c.c. every other day or every day. Rodagen is the dried milk of goats whose thyroids have been removed. Extract of suprarenal gland seems to work well especially when combined with quinin hydrobromid. Quinin hydrobromid, gr. 5, three times a day, is very valuable. It may be given for months or years.

℞. Ext. glandulæ suprarenalis..... gr. ij
Quininæ hydrobromidi..... gr. v
S.—One capsule t.i.d.

Sodium phosphate, one teaspoonful every morning, is also very good. It seems to be an antitoxin to the thyroid. Sodium glycerophosphate is very valuable. Ergot and digitalis aid the relaxed heart.

Potassium iodid is of value in simple goiter, causing it often to disappear, but it usually makes Basedow's disease worse.

The thyroid is stimulated by small doses of iodin, and it also stimulates the cerebrum and cerebration. In Basedow's disease the iodin is decreased in the gland and is in excess in the blood. Iodin is attracted to the cells of the thyroid. In small doses it has a tendency to stimulate the gland and cause absorption of retained secretions. The specific action of iodin in goiter (not exophthalmic, not hyperthyroidism) results only if functionating gland tissue is present, and hypertrophy will recede if dependent on improper function or retained secretion. In parenchymatous goiter, where all the constituents are enlarged, a potassium iodid

ointment is often sufficient. Simple hyperplasia, with good vascularization in the goiter of young people and in rapidly growing goiters, is well acted on by the iodin treatment.

HYPOPHYSIS

It appears from modern investigations that the hypophysis plays a part in the human economy, from childhood up, which is of great importance in the way of skeletal growth, mental development, genital development, sugar tolerance, etc. It produces, by its over-secretion, or under-secretion, most permanent and lasting changes in the bony structure of the body, in the laying up of fat, and influences to a decided degree the mental and nervous make-up of the individual.

The hypophysis is composed of an anterior and posterior part. The anterior seems to be concerned with processes of growth, the posterior seems to be concerned with metabolism, especially with that of sugar. If, in the growing child, the hypophysis fails to perform its functions, there is a failure in bone stimulation and tissue growth, there is failure in bony development, and the individual may become a dwarf. If the anterior lobe of the hypophysis functionates and secretes too actively during the years of growth, the skeleton becomes larger than normal, and if the process continues in the pre-adolescent stages, the individual becomes a giant. It can be readily seen that this tendency to become a giant exists so long as complete ossification of the epiphyses has not taken place. After the individual has attained his full growth in a normal manner, and after ossification of the epiphyses has occurred, over-activity of the anterior lobe stimulates bone growth, but not in the way of general increase in stature, for that is now no longer possible. It, however, produces changes in the bones of the face and hands and feet, producing the condition known as acromegaly. So much for the anterior lobe!

The posterior lobe is concerned mainly with the metabolism of sugar. If there is failure of function on the part of this lobe, there is a tendency to gain in weight, and at any period of life adiposity may result. In the young growing child there is then

a diffuse accumulation of fat over the entire body. If in the adult the same change occurs, the adiposity which is thus associated with lack of function of the posterior lobe has the name dystrophia adiposo-genitalis, because the hypophysis has a decidedly close relation to the development and preservation of the genitalia. In the younger years, before adolescence, anomalies of the hypophysis, as a rule, cause failure of development of the ovaries and of the uterus and of the other structures characteristic of the female. After adolescence anomalies of the hypophysis result in atrophy of the genitalia. The same thing, lack of development of the genitalia, is true with giants and dwarfs. In the one case there is too little secretion, in the other there is too much, and yet with either of these alterations genital dystrophy occurs. The same holds true in acromegaly. In fact, so pronounced are the changes in the ovaries with this latter condition that, in the minds of many investigators, hypofunction of the ovaries has been considered the primary factor in causing the changes in the hypophysis which are responsible for acromegaly.

Changes in the secretion and functions of the hypophysis have other effects than on growth and stature, than on the genitalia, than on the accumulation of fat and the metabolism of sugar. Changes in the secretion of the hypophysis are associated with alterations in other gland functions in the body. The relationship of the hypophysis to the adrenals, the pancreas, the thyroid, etc., is very close, but not so intimate as with the ovaries. The relationship of hypophysis to the psyche is close, for the various forms of hypophysis disease may produce nervous annoyances and psychic manifestations resembling hysteria, neurasthenia, etc.

Tumors of the hypophysis are frequently the cause of these diseases. In some cases they cause too much secretion, and in some cases they are responsible for a diminished secretion. In addition, they may produce symptoms due to their size and to the pressure which they produce within the cerebrum and on other nerve tissue. But, aside from this, functions of the hypophysis are altered and interfered with, without the presence of tumors. It seems that infections, intoxications, diseases of

other glands, pregnancy, menopause, and other states produce structural or functional alterations in the hypophysis,

It must be remembered that either lobe may be involved independently of the other, or that both may be affected at the same time. Either may be oversecreting, or undersecreting, without regard to the changes occurring in the other portion. In this way various combinations of phenomena and symptoms may be produced, involving bony growth, stature, accumulation of fat, alterations of temperature and pulse, changes in the other glands, psychical alterations, etc., resulting in symptoms which can be classified under no definite heading, but which require patience and attention to eventually diagnose and treat.

Hypopituitarism.—We may have hypopituitarism originating before adolescence or originating after. If hypopituitarism predominates, there results adiposity with skeletal and sexual infantilism in childhood (Fröhlich). Adiposity with sexual infantilism of the reversive type results when hypopituitarism originates in the adult. The posterior lobe secretion possibly discharges into the cerebrospinal fluid. The anterior lobe discharges secretory products into the blood stream. The anterior part is more closely related to other glands, but controls skeletal growth. Posterior lobe is more closely allied to tissue metabolism, and to the activity of the renal and vascular systems. Normal posterior lobe activity is essential to carbohydrate metabolism. A diminution of this secretion leads to a high tolerance for sugars, with a resultant accumulation of fat. In the majority of cases of adiposity there seems to be incomplete metabolism. The ineffectual burning up of the carbohydrates causes subnormal temperature. This is also common to insufficiency of the thyroid and adrenals.

Many cases of infantilism are due to a primary thyroid insufficiency. "Many cases regarded primarily as of thyroid origin, especially cretinoid states, may actually be due to defective hypophyseal activity, which is often associated with actual enlargement of the thyroid." Many types of skeletal undergrowth, as we know from the action of the anterior lobe in processes of growth, are due to hypophysis rather than thyroid. Hypophyseal cretinism and infantilism are recognizable, clinical

entities. Adiposis dolorosa is probably disturbed metabolism, secondary to disease of the ductless glands. Thyroid extract is actually of benefit in cases of hypophyseal obesity. Most cases of undoubted hypopituitarism have exhibited some degree of psychic disturbance, varying from nervousness to epilepsy and actual mental derangement. Pituitary deficiency, like thyroid deficiency, may cause signs of mental instability without encephalic lesion. "And there can be little doubt but that many of the psychasthenias and neuroses of one sort or another will prove to be associated with ductless gland disturbances, more particularly with those of hypophyseal origin" (Cushing).

A powerful galactogogue substance exists in the posterior lobe. The posterior lobe extracts have a specific action on smooth muscle and especially on uterine fibers.

In preadolescent hypopituitarism there is a tendency toward persistence of sexual infantilism and an imperfect or delayed acquirement of the so-called secondary sexual characteristics, just as in hyperpituitarism after puberty there is a tendency to testicular hypoplasia, impotence, amenorrhea, and some loss of secondary characteristics.

In pregnancy the pars anterior shows a multiplication of large neutrophilic elements, which are apparently derived from the normal chromophone cells (Hauptzellen). After labor the gland involutes, but never goes back to its previous size. This change, occurring in successive pregnancies, may bring about a physiologic inactive condition of the gland, and may produce the adiposity, loss of hair, asthenia, subnormal temperature, often seen after many pregnancies. On the other hand, overactivity may persist, leading first to acromegalic changes with final insufficiency. The interstitial cells of the genital glands and the corpus luteum exercise an important rôle in interglandular relations.

This hypophysis gland reacts normally to bacterial intoxication, and animals subjected to a partial hypophysectomy are extremely susceptible to infections, so that it is evident that the gland secretes some antagonistic substances.

With inefficiency of the hypophysis, somnolence is noticeable, just as in hibernation, there is a tendency toward great sleep, subnormal temperature, slow pulse, lowered metabolism, a

definite hypesthesia of the body to painful stimuli, and a hypoplasia of the sexual glands.

Hyporpituitarism.—If hyperpituitarism predominates there is overgrowth, resulting in gigantism when the process antedates ossification of the epiphyses (Launois); acromegaly when the process occurs after ossification. Hypophysis hyperactivity before adolescence and before ossification produces large stature; after ossification it produces acromegaly.

To cause skeletal undergrowth, glandular insufficiency must have been evident before full stature is attained; that is, before adolescence, though hypopituitarism later will dwarf the stature. That is likewise true in deficiency of the thyroid, the adrenals, and the thymus.

There is only one certain experimental method of inciting skeletal overgrowth, and that is by early castration.

The hypertrophic enlargement of the gland, or the histologic hyperplasia, are primary in the case of acromegaly and gigantism, but are secondary in the case of eunuchism.

Hypophyseal hyperplasia may be responsible for the rapid body growth which normally occurs at puberty. An exaggeration of the growth produces what is known as a "normal giant," an individual normally proportioned, sexually intact, with great physical strength. If this growth ceases for a time, then subsequent hyperplasia will produce acromegaly if ossification has taken place. As stated, acromegaly occurs if there is an interval between the two stages of hyperplasia. (An early postadolescent period of hyperpituitarism leads to physiologic overgrowth or normal gigantism.)

Many cases of hyperplasia show quiescent periods, after which recrudescences may occur. In other cases the process is permanently checked, the clinical traces of skeletal overgrowth being the only evidence. In others there results a change to glandular insufficiency, as the result of involution which may follow on the process of hyperplasia. The early growing child may show only coarseness of the tissues or other minor signs of a mild hyperplasia (Cushing).

"A spontaneous mellituria, even of such a degree as to simulate diabetes and to be accompanied by furunculosis, is not

uncommon in acromegaly and gigantism, and, I presume, that during the actual period of hyperpituitarism a low sugar tolerance, if not actual glycosuria, is probably found in all cases. Glycosuria is only a temporary symptom, and a giant or acromegalic may be in an active, quiescent or retrogressive stage of hyperpituitarism, and hence metabolism changes accordingly. The changes differ as much in the early and late stages of acromegaly as occurs between "Graves' disease and myxedema" (Cushing).

Whether obesity from castration may not occur through the resultant diminution of the ovarian function, or whether, contrariwise, the obesity of castration may not occur through the associated change in hypophysis activity, cannot be settled. Whether the obesity of castration is due to the fact that the hypophysis, in spite of its hypertrophy, or because of an insufficient hypertrophy, does not make up for the loss of the ovarian secretion, is to be cleared up in the future.

There are certainly puzzles in this question. That conditions which are to be referred to increased activity of the hypophysis, such as acromegaly on the one hand, and a partial destruction of the hypophysis on the other hand (hypophysis obesity), should both cause an atrophy of the genitalia, seems strange. A like condition exists in the sphere of the thyroid, where Basedow's disease and myxedema both lead to an inhibition of the genital function. Because of the antagonism between hypophysis and ovary, Thumin advised the treatment of acromegaly with ovarin, and advises the use of hypophysis extract for the treatment of uterine bleedings and other conditions due to hyperfunction of the ovaries. The extract of the posterior lobe acts like adrenalin, strengthens and slows heart activity, increases the amount of urine, and increases the contractility of smooth muscle fibers.

"At puberty changes occur which, if the hypophysis is unstable, may so alter the biochemical processes of the body that they border on the pathologic. The rapid increase in stature during the adolescent period probably accounts for the occasional spontaneous glycosurias of this period. This is probably true also in pregnancy in which there is a transient physiologic hyperpituitarism."

In pregnancy hypertrophic changes occur in the gland. Functional alterations occur comparable to those which more obviously affect the thyroid. It is possible that hyperplasia of the hypophysis may account for some symptoms during the last weeks, when there may occur fleeting bitemporal hemianopsia, hypertrophy of the tubinates, temporary enlargement of the lips and nose, with thickening of the tissues of the hands and feet, the frequent glycosurias of pregnancy, and increase in stature (Cushing).

We may have an over- or underactivity of both anterior and posterior lobes or of either one. There are mixed or transition cases with some features of both states. This may be called dyspituitarism. There may have been an overgrowth of one or both lobes, followed by insufficiency of one or both lobes. Other individuals suggest by undergrowth and adiposity, as well as by high sugar tolerance, an early interference with both lobes. Dystrophia adiposo-genitalis (Bartels) is due to glandular insufficiency. All cases of original hyperpituitarism associated with tumor may end in hypopituitarism. Many cases with existing hypopituitarism show traces at least of an early tendency to hyperpituitarism. Stages of pathologic overactivity of the gland tend toward a final stage of sluggishness in the way of secretion. Symptoms of one may be mixed with symptoms of the other. Hence the value of the term dyspituitarism.

Just as in the hyperthyroidism there are periods of remission and spontaneous cure, so the same occurs in hypophysis affections.

"It is probable that there are strains which run through families on Mendelian laws, and which betray the existence of ductless gland irregularities, unrelated to any postpartum influence. This includes inherited instability of the hypophysis. There are authentic instances of family diabetes of both kinds (mellitus, insipidus). Instability of the hypophysis may cause in various members of different generations hyperfunction in some, hypofunction in others. A functional glandular instability may make various members of the family susceptible to various alterations."

Polyglandular Combination or Syndrome.—This includes patients showing unmistakable evidence of ductless gland dis-

orders. In acromegaly there is a frequent co-existence of a goiter. There is early glycosuria, amenorrhea, pigmentation, and asthenia, suggesting affections of the thyroid, the pancreatic islets, the ovary, and adrenals. These organs are all involved, either by the underlying biochemic disturbance which is the background for many ductless gland disorders, or else they are secondarily implicated during the compensatory readjustment of metabolic processes consequent upon the primary derangement of the gland in question. A primary hypophyseal derangement is capable of bringing about a functional unsettling of the entire glandular series (Cushing).

"In the case of the thyroid and parathyroids the pituitary and pineal bodies, the adrenals, thymus, pancreatic islets, testis and ovary, disturbances of function, whether in the direction of increased or of lessened activity, will doubtless occasion reciprocal alterations in one or another of the correlated glands. Despite the ultimate polyglandular nature of the picture from the pathologic point of view, a primary disturbance of each one of these glands, whether in the direction of overactivity or underactivity, doubtless will be found to possess its own characteristic clinical syndrome, which differs from that of each of the other glands."

As a result of experimental reproduction, the symptoms associated with primary glandular insufficiency are the better known. Cretinism, myxedema, Addison's disease, pancreatic diabetes, parathyroid tetany, and the eunuchoid state are clinically recognizable. To this is to be added the dystrophia adiposo-genitalis, due to hypophyseal deficiency and possibly hypothymism and hypopinealism.

There are constant changes in the hypophysis during pregnancy. This gland is enlarged, and there is an increased secretion in pregnancy. Tandler and Gross compare the frequent changes in the face of pregnant women, especially the coarseness of the features, with the same changes occurring in acromegaly. It is exclusively the anterior lobe of the hypophysis which is altered in pregnancy. It is possible that the periosteal bony growths of pregnancy are due to the changes in the hypophysis. Whether the enlargement of the thyroid in pregnancy stands

in relation to the hypertrophy of the hypophysis cannot be definitely stated, neither can the question be answered whether the enlargement of the hypophysis may not be hypertrophy designed to substitute the lack of function of the ovaries. It is also possible that the change in the hypophysis is the result of changes in the uterus (ovum), and is designed to inhibit the function of the ovaries, or the changes of the hypophysis and the ovaries may be due to a common cause.

In recent years hypophysis diseases have been treated successfully by operations. Because of the antagonism between hypophysis and ovary, Thumin advises the treatment of acromegaly with ovarin, and advises the use of hypophysis extract for the treatment of uterine bleedings and other conditions due to hyperfunction of the ovaries. The extract of the posterior lobe acts like adrenalin, strengthens and slows heart activity, increases the amount of urine, and increases the contractility of smooth muscle fibers. For the last reason, pituitrin acts well on the bladder and uterus. It has a styptic action in various bleedings in the non-pregnant uterus, is a bladder tonic, and acts well in some cases of osteomalacia, and of course acts well in uterine atony in labor.

Hypopituitarism and Hypophysis Therapy.—After a complete removal of the hypophysis, a subcutaneous or intravenous injection of the emulsion of a single fresh gland would temporarily arouse to apparently normal activity a somnolent animal in whom a subnormal temperature betrayed the onset of a cachexia hypophyseopriva.

The manifestations of glandular deficiency, whether or not they are accompanied by pressure symptoms or by evidences of pre-existent overactivities, with more or less marked overgrowth, are (Cushing):

A tendency to subnormal temperature.
Dry skin.
Loss of hair.
A slow pulse.
A lowered blood pressure.
Asthenia.
Increased assimilation limits for carbohydrates.

Often associated with a tendency to adiposity.
Obstipation.
Polyuria.
Psychoses.
Tendency to epileptiform seizures.

The malady is a polyglandular one, and hence, in addition to hypophysis, may be helped by other glands, such as *adrenal and thyroid.* Even after a year of glandular feeding, amenorrhea may be relieved and *libido-et-potentio sexualis* may be restored. It only rarely has a marked effect on obesity. A combination of thyroid and hypophysis may stimulate tissue katabolism. Hypophysis extract may produce mental and physical rejuvenation; raises body temperature, raises blood-pressure, benefits obstipation, removes the drowsiness, improves mental activity, on the use of 12 grains of the dried whole-gland preparation three times a day. In some cases it works beautifully by hypodermic use.

Adipositas dolorosa, universalis, and *dystrophia adiposo-genitalis* are due to posterior lobe deficiency. To this symptom-complex of adiposity is added high sugar tolerance, subnormal temperature, slowed pulse, asthenia, drowsiness, all due to deficiency of the posterior lobe. The reverse condition follows on posterior lobe administration; namely, emaciation, spontaneous glycosuria, slightly elevated temperature. This may be produced by injections or by administering gland preparations by mouth. The adiposity of hypopituitarism is a generalized one, invading other organs, too, such as the liver. Increased deposition of fat may occur, also with deficiencies on the part of the sexual glands, the thyroid, and possibly, too, the pineal and adrenal.

Insufficiency of the posterior lobe may be associated with stimulation or inhibition of the anterior lobe; hence, coupled with obesity, we may have the combination of overgrowth with sexual precocity or the reverse, or undergrowth with sexual precocity or the reverse. (The sexual precocity, I think, may depend on other elements.) Hypertrichosis, adiposity, pigmentation, high blood-pressure, may be due to hyperadrenalism. Precocious sexual development, overgrowth, adiposity, may be due to hyperpinealism.

Dercum's disease means adiposity, tenderness and pain, asthenia, psychosis.

Extracts of the posterior lobe possess diuretic properties. The administration of posterior lobe extract causes an increase in the urinary output. A hormone in the pars nervosa activates renal secretion. There is, therefore, difficulty in explaining the diuresis which accompanies hypopituitarism, for one would expect these individuals to show a lowered urinary output. Some of the cases constitute almost a diabetes insipidus. In experimental hypophysectomy the amount of urine in animals increase to 2000 c.c. in twenty-four hours.

Temperature.—Subnormal temperature is a characteristic of insufficiency. This can be raised to the normal by glandular administration. There is a thermic reaction to the subcutaneous injection of extract of anterior lobe in animals in whom a deficiency of this part has been produced. In individuals with subnormal temperature a sufficient dose of the whole gland restores normal temperature. No thermic response follows the injection of saline solution of anterior lobe in normal animals. Injections of posterior lobe extract in hypopituitarism cause no thermic response.

Blood-pressure.—Hypopituitarism means low arterial tension, often below 100. When patients complain of asthenia, also, the pressure may be down to 70. Even in some cases, where the anterior lobe was still hyperactive, the pressure was low. There are some exceptions as regard low pressure with insufficiency, for the tension may be high. The low pressure with asthenia and pigmentation suggests that even where the malady is hypophyseal a secondary change in the adrenals, in the way of inactivity, may be responsible for these symptoms.

Low blood-pressure is present with hypopituitarism. Many acromegalies have a slight eosinophilia.

Drowsiness, torpidity, occurs with *hypopituitarism*. Many of the patients show an inclination to dose throughout the twenty-four hours; in others, the somnolent period occurs in more or less definite cycles, with intervening days of normal response. Glandular therapy improves the mental activity and lessens the

drowsiness. *Sleeplessness* would be expected to accompany hypersecretion, but this is rarely noted.

Anesthesia, or insensitiveness to pain, and obstipation are associated with hypopituitarism. Psychic disturbances—some are due to excess or perversion of secretion, others to insufficiency.

With hyperpituitarism *temperamental* changes are often apparent with *wakefulness*, lack of *concentration*, indecisiveness, *irritability*, distrust, in other words, *psychasthenic states*, which are not unlike those with which we are familiar, in moderate degrees of dysthyroidism. When hyperpituitarism dates from early life, the individual is usually deficient in educational training from the outset.

With *hypopituitarism* there are gradations of disturbance from mild psychoses to extreme mental derangement. There is inability to *concentrate;* there is impairment of memory. Former powers of mental activity may be restored with the readjustment of a physiologic balance through glandular administration. In most cases of hypopituitarism sufficient to cause adiposity, deviations from the normal intellectual level may be expected. There may also be drowsiness. Psychic disturbances of varying degree are common.

Dercum's disease includes psychic derangement.

Epilepsy.—Many patients with hypopituitarism have shown epileptiform tendencies.

As the posterior lobe secretion normally enters the cerebrospinal fluid, and thus comes in contact with the solution which bathes the cortex, it is possible that its diminution in hypophyseal disease may unfavorably affect the activity of the cortical cells.

THE OVARIES, THEIR FUNCTION AND RELATION TO NORMAL AND PATHOLOGIC STATES

The ovaries are glands with an outer covering of germinal epithelium, within which is a stroma or interstitial tissue containing thousands of follicles. The ovaries produce an internal secretion, possibly two different varieties, and the corpus luteum which develops during pregnancy produces a secretion perhaps of

a different character, or at least of a more intensive nature. When the ovaries begin to produce the accepted adult type of secretion, the result is made apparent by the onset of menstruation. But they certainly are functionating before this period of puberty, and thus they may be responsible for some of those skeletal differences between the female and male type, such as the difference in the form of the pelvis. The ovaries are responsible for the proper development and nutrition of the external and internal genitalia. Their main protective influence is exerted upon the uterus, and more particularly upon its lining, the endometrium. Diseases occurring in infants and children, which produce changes of an injurious nature in the ovaries of a permanent character, result in the various degrees of underdevelopment of the genitalia. Removal of the ovaries results in a cessation of menstruation, and the absence of the trophic effect of their secretion upon the uterus is evidenced by its atrophy. Experiments made on animals have proved beyond doubt that removal of the ovaries in the newly born results in failure of development of the genitalia and of the breasts. Removal of the ovaries after development of the genitalia and the breasts produces regressive changes in these organs, especially in the uterus. If, however, these ovaries when removed from their normal site are transplanted elsewhere in the abdomen or in the abdominal wall, and establish a new connection in these areas, no regressive changes occur in the genitalia and in the breasts. It is a fact, then, that the ovaries, so long as they are "alive," no matter where they are situated, exert this trophic and protective influence upon the uterus and the genitalia, through the medium of the circulation and by virtue of an internal secretion or secretions.

The distinction between the genitalia of the two sexes themselves constitutes the "primary sex characteristic," but a number of differences which are not connected with propagation, but which are characteristic of the being of the female, are called "secondary sex characteristics." Among these are the greater tendency to fat under the skin, and the resulting rounding of the body, the width of the hips, the marked development of the gluteal region, the length of the hair, the absence of beard, the

difference in the larynx. The difference in the pelvis is very marked. There is a slighter development in the features of the face, especially the lower jaw. The brain is smaller. Psychically, even as children, there is a taste for different forms of play. The differences are already apparent between the ages of eleven and fourteen as concerns the rounding of the features, the increase in the fat, especially in the mammæ, in the gluteal region, on the thighs, etc. The most important of the secondary sexual characteristics are the breasts (Novak).

A remarkable development of the mammary glands take place at puberty. This development is influenced by the ovary. The mammary gland assumes the part of a secondary characteristic of the female sex, attaining to complete development under the influence of the ripening ovary. (The hypertrophy which takes place in pregnancy is not due to the ovary but to the trophoblast.) The real function of the gland is developed by a secretion from the placenta, which promotes hyperplasia. The subsequent suppression of this secretion permits the onset of the secretory function.

The interrelation between the hypophysis and ovaries is extremely close. In the ovary there are three glandular elements:

(1) The follicles, concerned also with the production of ova.

(2) The corpus luteum of pregnancy, brought into existence by the reaction produced by placental ferments.

(3) The interstitial cell-body.

These interstitial cells are probably related to the acquirement of the secondary sexual characteristics. As a consequence of preadolescent castration the acquired characteristics of sex fail to appear. The reproductive functions covered by the follicles may not be impaired, even though complete secondary sexual characteristics have not appeared. The element of the ovary which is responsible for the constitutional physical changes which characterize puberty is probably the interstitial cell structure. Cases show imperfectly acquired secondary sexual characteristics when hypophyseal lesions antedate puberty, and a resultant amenorrhea with retrogressive sexual changes when the malady develops after adolescence (Cushing).

Hypersecretion or hyposecretion of the hypophysis, cause other changes than those related to the acquirement of adolescent characteristics. Thus, amenorrhea may be an early symptom with hypersecretion or hyposecretion of the hypophysis.

It must be remembered that the ripe ovary is filled with thousands of follicles in a quiescent state, and that at regular intervals at least one follicle develops, becomes larger, is filled with fluid, approaches the surface of the ovary, breaks through the ovarian covering, and throws out its liquor folliculi and the tiny ovum. It may be assumed that this follicle, with its contained fluid and ovum, represents either an added amount of ovarian secretion or a new form of ovarian secretion. If no pregnancy takes place, this corpus luteum becomes smaller, and finally ends in a form of scar tissue. If pregnancy does occur, it develops into a progressively growing structure, known as a true corpus luteum. Why, in the first instance, does the follicle become a scar within a short time and, in the second instance, why does it remain as a living functionating structure for several months? As the corpus luteum, it undoubtedly has a function. The explanation which we wish to make at the present moment is that the presence of the fecundated ovum within the uterus and the placental secretion which it throws into maternal circulation so stimulates the ovary (as it also stimulates other glands) that the follicle reacts by a progressive change, and continues as a living, functionating part of the ovary instead of ending its follicle function by becoming a healed area.

We know little about the secretion of the follicles, yet they probably nourish the uterine lining. It is said that subsequent ovulation in pregnancy is interfered with by the corpus luteum, so that pregnancy may not be interrupted. The integrity of the uterus depends on the secretory function of the follicles, and they produce the impulse of nutrition in the uterus, which, together with the cyclic phenomena of premenstrual and menstrual congestion and together with painless contractions, prevent the uterus from undergoing atrophy. How much the hypophysis may have to do with these painless contractions is only a matter of conjecture. The ovary, especially the corpus luteum,

produces a hormone, which, in association with the cyclic processes, causes decidual cell growth.

The secretion of the interstitial part is not definitely known. It may be related to the vasomotor apparatus, although the administration of lutein usually corrects these annoyances when due to climacteric changes. Biedl thinks that the interstitial gland controls the cyclic changes in the genital canal. There is certainly a relationship between the corpus luteum and the follicles on the one hand and the interstitial gland on the other. Alterations in other glands probably do not affect these two elements in the same way or to the same degree. Diseases or alterations of the ovary, as yet unrecognized, probably involve the follicle apparatus and the interstitial gland in a different way and to a different degree, so that there may be hyperfunction, or hypofunction, or either, in various combinations.

The ovarian secretion is responsible for menstruation. It is responsible for it in the following manner—it has a constitutional action on various mucous and serous membranes of the body, but has a special cumulative, selective, periodic, congestive influence upon the uterus, whereby the uterus becomes filled with blood, the capillaries become dilated, the endometrium is stimulated to hyperplasia, becoming thicker and turgid, the interstitial cells becoming larger and hexagonal in form, so that the uterus, and particularly its lining, becomes a nest ready for any ovum which may settle within its cavity. This is a wonderful provision of nature to furnish a thick, hyperplastic, moss-like lining, on which and in which the fecundated ovum may embed itself. This provision is wise for two reasons—first, it gives plenty of blood to serve as nutrition for the ovum, and second, it makes a thick lining into which the egg may settle. It must be mentioned, at this point, that the ovum is, strictly speaking, a parasite, which, by the very nature of the growth of its outer layer into trophoblast cells and chorionic villi, has a decided tendency to grow deeply through the uterine lining into the uterine wall. Here comes the added influence of the corpus luteum. This added factor further stimulates the uterine lining, making it a still thicker membrane, and in this way furnishing a favorable area into which the egg and its covering

cells may penetrate, and, at the same time, by the very thickness of this membrane, protecting the uterine wall from invasion.

The first decidual changes in the uterus are produced by the ovaries. It is true that removal of the ovaries in pregnancy causes no marked change, for, in spite of double castration, pregnancy takes normal course and so does the subsequent milk formation. It seems, therefore, that the ovaries trophically take care of the uterus and of the endometrium, prepare the endometrium for the nidation of the ovum, and then give way to other secretions. One ovary contains a corpus luteum, and, on theoretic grounds, it would seem that this is a secretion which should continue to protect the uterus, endometrium, and other body tissues against the local and systemic invasion of the chorionic villi and placenta. This may indeed be true, and, after double castration in pregnancy, either this ovarian secretion or corpus luteum secretion remains as a ferment, and thus continues its activity, or else some other gland structures take up the function which the corpus luteum supposedly performs.

During pregnancy changes occur in various of the gland structures of the body. A decided change takes place in the secretory activity of the hypophysis, structural changes occur which last for months, so that the gland never goes back to its former antepregnant state. Quite frequently during pregnancy an evident stimulation of growth, slightly resembling acromegaly, brings the participation of the hypophysis to our notice. Since the introduction of pituitrin, with its ofttimes magic effect in stimulating and accentuating labor pains, we have proof again that the hypophysis is concerned in various ways in the processes of pregnancy. The introduction into the body economy of the placental element, which constitutes a secretion, has its effect beyond doubt upon various gland structures of the body, and it is quite possible that this secretion is responsible for the corpus luteum and for the maximum decidual reaction, either by direct influence on the uterus or indirectly through the corpus luteum.

It is not to be understood that ônly the thickness of the decidua protects this lining and the uterine wall from penetration by the villi; other factors enter into consideration; namely,

certain elements or enzymes in the blood and in the decidua, which exert a delimiting effect on those cells that grow out from the ovum, and which so alter the character and penetrating power of these trophoblast cells as to in this way also protect the uterine wall from their too deep growth. It must not be overlooked that these very trophoblast cells, which grow into the decidua, are at all times being absorbed and thrown into the blood current, where they circulate, become dissolved, and constitute what we have called the *placental secretion*, a secretion which exerts an influence on the mother from the very first moment that a fecundated ovum embeds itself; in fact, the only satisfactory explanation for the cessation of menstruation when pregnancy occurs is furnished by making use of the fact that a placental secretion exists. This secretion, when absorbed, acts as an antagonist to that part of the ovarian secretion which causes menstruation. It has already been stated that the ovarian secretion produces the congestion and hyperemia in the premenstrual few days. This congestion and hyperemia rises to such a high pitch that diapedesis and rhexis occur in the capillaries of the endometrium, which relieves the tension in that tissue, the consequent loss of blood constituting the phase known as menstruation. It can be readily understood that an overstimulation on the part of the ovarian secretion may be responsible in this way for a too profuse flow of blood. The character of the blood itself, or a lack of a proper coagulating ferment, or an abnormal character of the capillaries, may be responsible for a too profuse flow of blood. An abnormal type of endometrium, such as is commonly called "fungoid," or the existence of a diffuse or localized polypoid form of mucous membrane, may result from overstimulation by ovarian hormones, and may be readily responsible for an excessive flow of blood. A uterus which does not contract well and which, because of rhythmic repeated contractions of insufficiently effectual power, does not hasten the approach of the relative anemia of the postmenstrual period, will naturally be responsible for a too excessive flow or a too protracted flow of blood; in other words, if a uterus is normal, if its lining is normal, and if the blood is normal, such a uterus is able to resist the hyperemic congestive influence of the ovarian

secretion for a certain period only. That period follows in the human being, as a rule, the type of twenty-eight days. If this secretion is too powerful in its effect, or if the blood or the lining of the uterus are abnormal, then the capillaries cannot resist this congestive influence for the period of twenty-eight days, and menstruation occurs too early or else too long. On the other hand, the ovarian secretion may be of such a diminished energy or power that it is unable in an interval of only twenty-eight days to produce sufficient tension or change in the capillaries as to have them break and allow a flow of blood; or the endometrium or the capillaries may be so constituted or altered that they resist this power of the ovaries, and for either of these reasons the menstrual interval is prolonged to five weeks, six weeks, two months, or ofttimes longer, regularly or irregularly. This does not of necessity affect the power of the ovary to produce ova capable of fecundation. When the ovarian enzyme, or enzymes, are producing this congestion in uterus, and bringing on such a turgid condition of the endometrium as to presuppose the relief of this state by the outflow of blood, if at this time a fecundated ovum throws its own particular enzyme into the circulation, it either nullifies this particular phase of the ovarian secretions' activities or else it locally, or through the blood, affects or alters the capillaries, and by either of these two processes the outflow of blood is inhibited. It may be then taken for granted that during the succeeding months of pregnancy it is the particular function of the ovarian secretion, with the newly added power of the corpus luteum, to trophically nourish and stimulate the uterine lining and the uterine wall, and to thus protect it against the local activities of the ovum. We have a right to suppose that the ovarian secretion, together with the added secretion of the corpus luteum, has a constitutional influence whereby its enzyme power is exerted to influence or counteract that secretion which the ovum, through the growth of its outer layers, is continually throwing into the body. In other words, we may with reason express the conviction that the ovaries are among the glands which aid the mother in her fight against the local and constitutional activities of the parasitic ovum and its placental secretion.

We know that the development of the genital glands is influenced by a large number of internal secretory organs. Early and exceptional development of the body and genital glands may be the result of tumors occurring in the suprarenals, in the pituitary glands, or the pineal gland. Hypophyseal affections tend, as a general rule, to genital atrophy.

The effect of late genital maturity, like that of genital hypoplasia, is to increase the height, especially the length of the legs, while early genital maturity causes premature closing of the epiphyses and is associated with short legs. The relationship between the ovaries and those other secretory organs which influence the growth of bone is remarkable. Castration is followed by changes in the thyroid, thymus, and hypophysis. Removal of the ovaries causes an increase of the hypophysis. Certain changes in pregnancy resembling acromegaly are due to primary hypofunction of the ovaries and secondary hyperfunction of the hypophysis, since, during pregnancy, ovarian activity is in a way inhibited. Senile decay is associated with regressive changes in the internal secretory organs, especially the thyroid.

After castration metabolism is much reduced. The diminished metabolism may be raised 50 per cent. by ovarian extract. The increase in metabolism is due to the changes in substances which do not contain nitrogen. There is a relationship between the ovaries and the suprarenal cortex. The principal rôle in osteomalacia, too, is played by the ovaries. The ovaries have always been considered as a factor in chlorosis, either through hyperfunction or malfunction. Wallart thinks there is a relationship between the interstitial ovarian secretion and the formation of the blood.

Castration never produces the positive characteristics of the opposite sex, but results in a certain fixation of an infantile type. Early castration is followed by excessive longitudinal growth, a lack of proportion between the length of the trunk and that of the extremities.

It seems that after castration the body length is greater. The sella turcica is then increased as an expression of the enlargement of the hypophysis. Removal of the ovaries causes a

great atrophy of the uterus, has a little effect on the vagina, and almost none on the external genitalia. In individuals castrated during the early years the instinct of sexual desire does not exist unless there has been a preceding somatic psychic-sexual puberty. Has there once been an awakening of the sexual desire, or an actual experience of it, then the memory pictures obtained thereby (the so-called libido centralis) work against the disappearance of the "Geschlechtstrieb" after castration. For this reason the majority of cases of castration find little difference in libido.

Puberty is a critical period for the growing girl. The ovary begins to manifest the power which it is to exert for many years. It exerts its function to a heightened degree locally in the pelvis; it exerts its function probably through psychic channels; and it, in all probability, so stimulates other glandular functions that the organism of the girl adapts itself to these new influences with variations, from that of a simple adjustment, up through the various degrees of temporary maladjustment to the highest degree of temporary or protracted maladjustment. In this connection, we must pay attention most particularly to the element of the thyroid secretion. When the ovary begins to assume its full active position in the economy of the growing girl, changes of a marked nature occur with a certain degree of regularity. We must credit the impulse for these changes to the secretion produced by the ovaries. By cumulative action, a gradual congestion and hyperemia and a stimulation or irritation is produced in many portions of the body at intervals of twenty-eight days. Before and during menstruation the vocal chords become hyperemic; the same occurs in the mucous membrane of the stomach and intestines and in the mucous membrane of the nose. There is a tendency to irritability in the central nervous system, the breasts become full and sensitive, there is a feeling of weight in the pelvis. These symptoms, and other annoyances of a still greater degree, in many instances precede the onset of menstruation, and represent the highest point of the premenstrual wave, the symptoms persisting more or less during menstruation and then gradually ebbing away. Some patients are almost unaware, so far as constitutional manifestations are concerned, of the onset

of menstruation, while others can foretell this period by one or more of these prodromal symptoms. So far as the irritability of the nervous system is concerned, the degree to which the individual reacts to the premenstrual and menstrual stimulus is an index of the stability of the nervous system. It is not so much the fact that ovarian secretion of different strengths effects these different degrees of irritability, etc., as it is that organisms and nervous systems of different grades of resistance react differently. A question of importance concerns the possibility of another secretion, other than the ovarian, as a probable factor in the production of some of these annoyances.

Many girls enter into the menstrual phase, irregularly or regularly, with few, if any, constitutional annoyances. Some go on in this placid way during a greater or the entire portion of their lives, unless some intercurrent condition alters this smooth progress. Others at some subsequent period acquire varying degrees of constitutional phenomena in association with the premenstrual and menstrual phases. In some instances puberty has associated with it symptoms of an annoying character, which may disappear after a certain period of time, or which may persist or grow worse at a later period. At puberty there is a tendency to cardiac irregularity, shortness of breath, and symptoms of a nervous nature, which may be due to the inability of the system to adjust itself calmly to the ovarian secretion, or it may be due to the fact that the ovaries, which are to be viewed as closely related to the thyroid glands, so stimulate the thyroid that it acts irregularly, often with too great force, and, therefore, though in varying degrees, the individual is really suffering from hyperthyroidism. In some cases the ovarian secretion is constantly stimulating the thyroid; in other instances, it may do so before each menstrual period; in still other instances, it may do so at irregular intervals. It may be seen from these statements that either secretion may stimulate the other gland, or may influence the other by its own superior power. In other words, the ovaries may secrete too little. If the thyroid secretion does not diminish in equal ratio, then there is, relatively speaking, too much thyroid in the body. There may, on the other hand, be too much thyroid secreted, and this may so antagonize the secre-

tion of the ovaries that their function is not properly carried out. The ovaries may be secreting too much, and this excess of secretion may either overstimulate the thyroid gland or may antagonize, and, to a certain degree, inhibit the thyroid gland's function. In some instances there may be too much secreted by both thyroid and ovary; in other instances they may each be secreting entirely too little. In this way there may be produced a variety of symptoms, either before or during menstruation, or at certain regular or irregular intervals, or more or less continuously. What part the hypophysis may play in the production of these relations, or what part it may play in association with these two secretions, will be discussed on another page. It is of interest to recall a few facts concerning the thyroid gland. The thyroid gland has an important function in women, and it is abnormally altered in them much more frequently than in men. Myxedema and Basedow's disease are far more frequent in women than in men. The thyroid gland seems to swell before menstruation; during pregnancy, before and during labor. The frequent tendency to irritability of the nervous system during these periods is to be traced to the relation between the ovarian and thyroid secretion, which practically at these times constitutes a hyperthyroidism. On the other hand, there are actual periods of hypothyroidism, associated with which there may be a coincident diminution of the ovarian function, or the ovarian function may be actually or relatively increased, and it is possible that in certain cases actual hyperfunction on the part of the ovaries may be responsible for a relative hypofunction of the thyroid. It may be readily seen that this play of the two secretions, altered as their relation must necessarily be during the various phases through which womankind goes, renders instability of the nervous system quite frequent. It is this condition which aids materially in making womankind the weaker sex, and not until the menopause comes on, and not until the ovarian secretion and the thyroid finally assume a quiescent and not constantly changing relationship, do thousands of women find that peace of bodily, nervous, and mental function to which we give the name of good health. When, to these various alterations, there is added the function of the breasts and the influence which lactation or the

absence of lactation exert we have another factor which increases the instability of which we have made mention.

Development of the breasts depends to a great extent on the trophic stimulation of the ovaries. They develop markedly before puberty. In the climacterium there is a progressive atrophy of the mammæ. The relation between the two, mamma and genitalia, is not through nerve channels. Hypoplasia of the mamma occurs in the young after castration and may be avoided by ovarian transplantation. The pregnancy changes in the mamma are due to some new internal secretion. The development of the breasts before puberty, their rapid growth at that period, their swelling before menstruation, their atrophy at the menopause, are dependent on the secretion of the ovaries. What new secretion prompts the marked hypertrophy during pregnancy and the secretion of milk after labor? Both these alterations take place even if the ovaries have been removed early in pregnancy. According to Halban, the placenta during pregnancy assumes some of the functions of the ovary, the activity of the latter being supposedly inhibited during this state. After labor, when the placental secretion is no longer to be considered, a puerperal involution takes place in the mamma and milk is secreted. It has often been noticed that the secretion in the breasts during pregnancy changes to milk when the fetus dies; hence, cessation of function on the part of the placenta seems to be necessary to starting the secretion of milk. On the other hand, injection of placental extract increases the milk secretion in nursing animals and rouses a secretion which has nearly stopped. According to Halban, ovarian secretion and the placental secretion have analogous functions. From the theoretic standpoint, it always seemed to me that the ovary and placenta are antagonistic, and that the ovary is one of the glands which protects the uterus from too deep inroads on the part of the trophoblast cells. At any rate, the ovaries, when they again come into function after labor, are able to produce in the breasts the secretion of milk after the system has taken up or been acted upon by secretion of the placenta. In other words, the ovaries take trophic care of the breasts; when placental secretion is added to the circulation some preparatory change takes place in the

mamma which is essential to milk formation. Milk formation then takes place only when this placental secretion is removed as an active factor. Then, it seems the ovaries aid in establishing the flow of milk, though this occurs even when the ovaries have been removed. What relation the thyroid bears to milk formation is not known. We do, from practical experience, realize that small doses of thyroid extract stimulate the breasts to increased function, but this is probably only another evidence of the great importance of the thyroid in the metabolism of the body.

In climacteric uterine atrophy there are usual anatomic or clinical evidences of a hypofunction of the ovaries. The absence of molimina menstrualia speak for like processes in the ovaries and uterus. Senile involution and lactation atrophy are in a degree physiologic. Thorn believes that stimuli which pass out from the mamma are the cause of uterine contractions which result in atrophy. Lactation atrophy is probably a result of a temporary cessation of function on the part of the ovaries, or is due to a diversion of their trophic influence to the breasts, in this way depriving the uterus of its regular stimulation. In lactation atrophy vasomotor annoyances, such as seen after castration, are not evident. Some ovarian activity perhaps persists, or else that part of the ovary which protects these functions is intact, and there is a disturbance of the follicle or interstitial secretion resulting in amenorrhea.

Neuroses Connected with Ovarian Atrophy.—Mental irritability is the most distressing symptom; the sense of apprehension, inability to control the temper, restlessness, states of depression, defects of judgment and memory, lack of self-control, are frequent symptoms; intense headache, pain in the back of the head and neck, sudden flushes, sensations of pressure in the head, irregular digestion, irritability of the bladder, pains in the muscles.

These symptoms seem to be periodically increased after menopause, at a time coincident with what should be the normal period, but are more or less present for two years after suppression of the function of the ovaries. Many of the symptoms appearing at the menopause are suggestive of the hypersecretion of the thyroid, as they are similar to symptoms occurring in Basedow's

disease, but they are not wholly due to such a hypersecretion, as is proved by the fact that administration of lutein or of ovarian extract causes marked improvement.

The relation of thyroid and ovaries is shown by the swelling of the thyroid during the first weeks of married life. When the ovaries cease to perform their functions, they may be (1) a hypersecretion of the thyroid leading to the sense of deep flushes, rapid pulse, and mental irritability; or there may be (2) cessation of the thyroid, leading to an accumulation of fat, a sluggish state of metabolism, and depression and partial dementia; the first form is treated by the use of lutein for weeks, the latter by the use of thyroid for a long period (Starr).

Neurotic Symptoms Dependent on Hypophysis Disturbances.—There are mental changes, such as lack of ambition, indifference to matters of importance, inability to do ordinary work, and a state of mind such as seen with chronic opium habit. The extreme forms are easily recognized. In so-called neurasthenics many minor conditions are probably due to disturbances of this gland. There is also a type of neurasthenic who is fat, gaining in weight, has a lack of ambition, craving for sweets, and in all probability some of the nervous manifestations are due to the hypophysis. In two or three such cases of marked headache, the use of pituitary extract has caused relief and has improved many of the nervous symptoms. These cases may also be improved by thyroid extract, which acts very much like hypophysis. Starr gives one or two grains a day for ten days, then an intermission of five days, and then again.

In myxedema, patients are depressed almost to the verge of melancholy without the self-accusation and despair of true melancholia. They are sluggish in their thought, unable to remember recent events, indifferent to their surroundings, without interest in personal and family affairs. They take an unfavorable view of their own condition, their will-power is impaired. There is a mental inertia, they are inclined to be sleepy, and often sleep heavily, both day and night, and awake without any sense of refreshment.

Physically there is a dryness of the skin and hair; the skin does not perspire, it becomes pigmented; the hair falls out or

becomes gray. The surface of the body is cold, the hands and feet are always cold. Appetite and digestion are impaired. There is an interference with the calcium metabolism. There is a progressive gain in weight. There may be constant pain in the muscles and bones. Levi, of Paris, says that in many cases of chronic rheumatism thyroid treatment is the best. When nervous or neurasthenic patients complain of such symptoms, one grain of thyroid twice a day, added to the other treatment, is of value. In ten days the effect should be evident in less dryness of the skin, in relief from the sensation of cold, and in the decided improvement in mental activity.

Mental sluggishness in young girls, with symptoms resembling dementia præcox, and considered as cases of weak-mindedness, may obtain mental activity by thyroids. The symptoms are not enough to warrant the diagnosis of myxedema, but the dry scaly skin, dryness of the hair, and coldness of the body suggest thyroid extract (Starr).

Ovarin.—It seems strange that after all the tremendous amount of experimental work which has been done, and after all of the verification which physiologic and pathologic investigations have given in the pursuit of this topic, there should still be physicians who doubt the existence of an ovarian secretion. They readily grant the tremendous importance of the thyroid and the suprarenal structures, and are now beginning to recognize the important rôle of the hypophysis. Recognition of the importance of the thyroid and adrenal apparatus was probably furthered by the therapeutic results obtained by the secretions of these glands, used experimentally or medically. The fact that up to date no ovarian secretion has been produced, which produces in the same short space of time marked or noticeable effects, possibly accounts in a measure for the failure to grant to the ovaries the place they deserve as most important factors in the female economy, aside from their very important function of producing ova. At almost all periods of life the thyroid, and the suprarenals especially, are intimately concerned with the vital daily processes to a greater or lesser degree. Whereas the ovary exerts its influence over a very extended period of time in channels and ways which show no decided alterations, but

only gradual but lasting phenomena, it must be granted by everyone that removal of the ovaries in young animals or young human beings stops complete development of the mammary gland and the external and internal genitalia, especially the uterus. In adult women, removal of the ovaries is followed by atrophy of the internal genitalia, most particularly the uterus. At the climacterium regressive changes in the ovaries are followed by atrophy of the genitalia. These factors are universally known, and they are generally recognized as resulting through the failure of a secretion produced by the ovaries. The ovary has a remarkable effect, too, in influencing the form of bony growths in the female. It produces the female type of pelvis; it has to do with the degree and extent of skeletal growth. It is intimately concerned with the changes produced in osteomalacia. It has an intimate relationship with the thyroid, the thymus, and the hypophysis, glands which are extremely important in the processes of bony growth and of ossification. The alterations produced in the ovary in acromegaly are so decided that, in the minds of many observers, they are the primary factors in the production of this disease. The same holds true in the cases of giants and dwarfs. All these, and innumerable other points, which I have previously mentioned, prove the great importance which the ovaries bear in the general economy; however, to be sure, scarcely vital. The most important, and, in my mind, extremely important, relationship in women exists between the ovary and the thyroid. Many years ago my attention was attracted in this direction by the observation that, in many cases of ovarian hypofunction in young women, there were symptoms of a digestive and general nervous nature that implied a toxic irritation by some other secretion. The study of the changes produced at puberty, before menstruation, before and during the climacterium, taught me that in innumerable cases we were dealing with actual or relative hyperthyroidism, and I gave to that class of patients, in whom an excess of thyroid was due to hypofunction of the normally antagonizing ovarian secretion, the name of relative Basedow's disease. Many of these cases manifested their annoyances in association with menstruation—that is, usually in the premenstrual phase—and it is

important in this type, of what might be called constitutional dysmenorrhea, to distinguish between the cases due to overactivity of the ovarian secretion itself, and due to its being in excess, so to speak, and the type where the annoyances are due to ovarian stimulation, producing an excess of thyroid secretion. In other words, we may distinguish three types: (1) The annoyances are due to too much ovarian secretion; (2) there is normal stimulation, by either ovarian or thyroid secretion in a patient with an extremely hypersensitive organism; (3) there is real hyperthyroidism.

The diagnosis between the annoyances due to excessive ovarian stimulation on the one hand, and hyperthyroidism stimulated by the ovarian secretion, may be in many instances readily made by the use of ovarian extract and of thyroid extract. Any patient suffering from this premenstrual dysmenorrhea of a constitutional type due to hyperthyroidism is made distinctly worse by the use of thyroid extract, 1 to 3 grs. three times a day. Any patient whose premenstrual annoyance is due to the presence in the blood of an excess of the ovarian hormone is benefited by the exhibition of thyroid extract. In this type of case, and in cases of a nervous nature, at whatever age or stage, I have for years made use of the thyroid extract for diagnostic purposes, and have unearthed thereby many cases of relative and actual hyperthyroidism, and have seen several of these patients subsequently develop distinct signs which absolutely verified the diagnosis. In my experience, ovarian extract is a valuable drug. Lutein extract has also given me good results, but by no means more distinct. I find that ovarian extract is of great value in the minor degrees of hyperthyroidism, especially the forms depending on hypofunction of the ovaries. It is a very valuable drug in lactation atrophy of the uterus. It has given me for years very good results in the flashes of the climacterium, especially when begun early. If begun shortly after operation, there are few cases of castration who suffer very much from the so-called flashes. In the few cases of chlorosis which have come under my observation, and in the many cases of anemia, it has served me very well. I learned many years ago to combine iron and arsenic with ovarian extract in almost every indicated case,

especially where the hemoglobin was reduced, and, on the other hand, in cases of anemia, where the iron was the primary indication, I almost invariably added ovarian extract. So that to-day I have adopted for myself the rule when you give iron also give ovarin; when you give ovarin also give iron. I find that each accentuates the action of the other. In amenorrhea, relative or absolute, it has been my standby for years. The type in which least influence on the amenorrhea is obtained is the precocious menopause of obesity, which I am now beginning to consider in many cases as a dystrophia adiposogenitalis, dependent on some disturbance in which the hypophysis plays an important part. Ovarian extract is a drug which must be used for a long time, and one which must be judiciously combined with other drugs. It produces no annoyances, and the main contraindication consists of profuse bleedings. I have, in many instances, combined ovarian extract with thyroid, especially to promote metabolism and encourage oxidation. The annoying symptoms produced by thyroid extract are often surprisingly diminished by adding ovarian extract. For therapeutic purposes I have learned to give small doses of thyroid extract, ½ gr. three times a day, often producing splendid results. For diagnostic purposes I give larger doses, as much as 5 gr. three times a day.

HYPERGENITALISM (PUBERTAS PRÆCOX)

The somatic and psychic characteristics of puberty are dependent to a great extent upon the maturity of the genital glands.

Premature puberty includes accelerated ossification. Skiagrams show a rapid approach of epiphyseal ossification to the stage when the synarthroses close. This finding is in accordance with that of physiologic puberty, for, in the latter condition, proliferation of the epiphyses soon ceases. Gigantism, on the contrary, is characterized by persistence of epiphyseal synarthroses and by the abnormal height to which this leads (Biedl).

The most important point in regard to the etiology of pubertas præcox is whether or not the condition is primarily the outcome of precocious development of the genital gland. Hypergenitalism and pubertic precocity may be primary or else the secondary results of the primary affection of other glands. This applies

to cases in which tumors were present, either in the suprarenals, in the hypophysis, or the pineal glands.

Hypophyseal affections are frequently associated with gigantism, although generally with genital atrophy.

Cases of pineal tumor show abnormal growth in height and premature genital and sexual development and corresponding mental precocity.

The presence of suprarenal tumor in sexual precocity is remarkably frequent. There is exceptional development of the body, obesity, physical precocity, the habit of sexually mature persons, extreme hypertrichosis.

If we exclude these observations, a large number of cases remain which cannot be explained otherwise than by primary hypergenitalism.

The genital glands have a great effect upon the growth of the skeleton. Experiments show that in man as in animals castration is followed by excessive longitudinal growth. A lack of proportion between the length of the extremities and that of the trunk, and persistence of the epiphyseal synarthroses beyond the normal age.

Protracted epiphyseal separation may result, not only from the operative removal of the generative glands, but also from hypoplastic subdevelopment of them. The presence of this symptom, in combination with the persistence of other juvenile traits, is described as immaturity of the organism or eunuchoidia. These cases do not altogether fall into the group of pathologic conditions classed as infantilism, for infantilism is characterized by the small size of the skeleton and its infantile proportions; *i. e.*, long trunk and short extremities. Hypoplasia of the genital gland is presumably accompanied by symptoms analogous to those of suppression; *i. e.*, abnormal longitudinal growth, especially in the legs, and considerable increase in the fat body. Thus, the only true cases of hypogenitalism would be those of infantile gigantism, which are characterized by abnormal growth of the long bone, imperfect secondary sex characteristics, and deficient mental development, and in which testicular atrophy and the absence of any signs of pituitary disease justify the assumption of primary hypogenitalism.

The age in which genital maturity takes place has a paramount influence upon the growth of the skeleton. The effect of late maturity, like that of genital hypoplasia, is to increase the height, especially the length of the legs, while early maturity brings about premature closing of the epiphyses, and is consequently associated with shortness of the legs. Inhabitants of warm countries are generally small of stature. These results are to be attributed to early sexual maturity.

There is intimate relationship between the development of the skeleton and the internal secretory activity of the genital glands, The genital glands elaborate a hormone, which stimulates the processes of ossification. Castration is followed by changes in the thyroid, thymus, and hypophysis, and the removal of these organs produces changes in the structure of the genital gland. It is, therefore, very difficult to estimate the extent to which the skeleton is directly influenced by the genital glands, because the thymus, thyroid, and hypophysis all effect the growth of the bone, their combined influence being complicated, in part antagonistic, in part co-operative.

HYPOGENITALISM (SEXUAL INFANTILISM)

Infantilism includes a group of variations which differ very much, but which include various degrees of retardation of development. In addition to that retardation which affects certain organs, or which affects certain systems (such as the osseous system, the cardiovascular system, or the nervous system, or the sexual organs, or which constitutes a general retardation of development), there is the retardation which is functional rather than organic. An arrest of development which affects the mass of the individual may result from various causes, from infections, such as infections of the cardiac or arterial systems. A normal development may be inhibited by transmission of hereditary faults, or by errors of hygiene during infancy and early childhood. Infantilism may result from anemia and chlorosis, from tuberculosis or lues, or from intestinal conditions, as mentioned by Herter.

Infantilism includes alterations in the osseous system, such as

slight body development, gracile bone development, deformities of the skull, hypoplasia of the jaw, irregular tooth development, and the various degrees of skeletal undergrowth. There results delicacy, smallness of the body, and the individual is an adult in small mold.

Infantilism has been considered an anomaly of development, in which the general morphologic characteristics belonging to infancy persist in a subject who has passed the age of puberty. Thus infantilism formerly signified a persistence of infantile characteristics. This view included other elements in addition to stature, and to the element of skeletal undergrowth was added variations in the development of the generative organs of the degree of sexual dystrophy.

To-day we are inclined to consider under infantilism a retardation of development that may begin at any age, and results in the persistence of the physical characteristics that exists at the age of its onset. It means that development remains stationary at a stage which a normal individual of the same age has long passed. This unripeness, just as it may affect the entire organism, may also affect only certain organs (infantilismus partialis) or certain organ systems, or else it may affect the entire organism (infantilismus universalis). Development of any organ concerns a differentiation in external and internal form, also a change in size, also a change in position, so that an inhibition of growth may concern the form (horseshoe kidney), size (narrow aorta), or position, undescended testicle (cryptorchism).

Though a retardation of development may manifest itself in a retardation of development of the osseous system or the nervous system, or the cardiovascular system or the sexual organs, it does not, by any means, affect equally all parts. Infantilism may also signify retardation in functional development, and this may be general or confined to certain systems, or may be local; hence, asthenia universalis congenita is a functional form of infantilism, so is visceroptosis, so is flat-foot, and so are other forms of asthenia.

Many of the pictures under the heading of Infantilism have been such as resulted from the effects of hypothyroidism.

Thyroid.—Hypothyroidism inhibits the growth, especially

of the long bones, associated with which is the tendency to become more stout and plump. There are changes in the growth of hair; there is enlargement of the abdomen, diminution of the temperature, there is a mucoid edema of the subcutaneous tissue, atheromatous changes in the aorta; there is genital hypoplasia, sterility, and idiocy. These are observed where, in animals or human beings, there is a complete defect of the thyroid. These changes are especially noted in absence of the thyroids in young animals still in the early periods of growth. In older animals the changes are less marked. The animals then show apathy, trophic disturbances of the skin, alterations in digestion, loss of weight, anemia, and a disposition to infectious diseases, to which they readily succumb. The genital functions are diminished.

The same changes occur in human beings after removal of the entire thyroids. This is the so-called cachexia-strumipriva. A further symptom of this cachexia is a diminution of the mental energy, of the energy for work, and a typical edematous swelling of the skin. The skin is dry through a diminution of the perspiration, the hair falls out, the patients look old and stupid, the red blood-cells are diminished.

In congenital myxedema there is a decided inhibition of growth. There is obstinate obstipation, psychic disturbances, and a marked inhibiting effect on the sexual organs. In the congenital absence of the thyroid and in the infantile cases of atrophy of the thyroid (which atrophy develops in the fifth and sixth years), the large majority of the cases are found in female children. Myxedema in adults is more frequent than infantile myxedema. At that period 80 per cent. of the cases are in women. Here anomalies in the function of the female genitalia are frequent. Amenorrhea is frequent, but menorrhagia also occurs; in many cases the genitalia remain normal; in other cases a decided *atrophy* is found.

Infantilism may be the result of alterations or deficiency in glandular functions. It may result from the so-called status lymphaticus, where fatty marrow is present instead of red-bone marrow. It may result from persistence of the thymus, insufficiency of the thyroid or faulty secretion of the suprarenals, or

pancreatic insufficiency, or deficiency of the hypophysis or ovaries, or chromaffine tissue.

Thymus.—Involution of the thymus coincides normally with adolescence. There may, however, be the so-called persistent thymus. The thymus exercises an inhibitory influence upon the development of the ovaries, and involution of the thymus is consequent upon the maturity of the sexual glands. Individuals with hypoplastic ovaries retain the thymus longer than normal. In this form of status thymicus there is a question whether the thymus is in direct relation with the genitalia, or whether both are not a symptom of a slow development. In the status thymicus there is a general enlargement of the lymph-glands, of the tonsils, of the follicles at the base of the tongue, enlargement of the spleen, marrow, aorta, large, pale, soft heart.

If with infantile signs in the body there is genital hypoplasia, with late menstruation, narrow pelvis, large tonsils, possibly slight Basedow symptoms, we must always think of the "status lymphaticus."

Vascular Hypoplasia.—Vascular hypoplasia, with narrow aorta, may be present with or without chlorosis. In vascular hypoplasia anomalies of genital function may occur. Menstruation develops late, there are various forms of dysmenorrhea or amenorrhea, though occasionally there may be bleedings at puberty. When genital and vascular hypoplasia exist in the same individual, they must be considered as co-ordinated results of a general disturbance of development.

Ovaries.—Absence of or alterations in the internal secretion of the ovaries may be the cause of infantilism. The type varies according to the period at which changes occur. Castration of young animals arrests the development of the genital organs; castration of adults changes only the secondary sexual characteristics. Therefore, infantilism may be a regressive change, occurring after atrophy of the ovaries. Atrophy of the ovaries may be secondary to affections of the hypophysis and thyroid. Involvement of the hypophysis causes a typical type of infantilism, with a disappearance of the sexual characteristics. The size of the individual should not lead to wrong conclusions, for early development of the ovaries causes early ossification, and

so limits the height of the individual, while absence or late development may delay ossification, and cause increased length of the lower extremities. The secretion of the ovaries assures the development of the genital organs and the appearance and the continuation of the secondary sexual characteristics, so that congenital or early involvement of the ovaries may prevent the development of the secondary sexual characteristics. The distinction between the genitalia themselves constitutes the "primary sexual characteristic," but a number of differences which are not connected with propagation, but which are characteristic of the being of the female, are called "secondary sexual characteristics," such as greater tendency to fat under the skin and the resulting rounding of the body, the width of the hips, the marked development of the gluteal region, the length of the hair, the absence of beard, the difference in the larynx. The most important of the secondary sexual characteristics are the breasts. The difference in the pelvis is very marked. There is a slighter development of the features of the face, especially the lower jaw. The brain is smaller. Physically, even as children, there is a taste for different forms of play. The difference may be brought under three headings. First, as regards propagation (pelvis, breasts, etc.); second, as connected with the pelvic glands (ovaries), skeleton, larynx; third, variety in inclinations. The differences are already apparent between the ages of eleven and fourteen as concerns the rounding of the features, the increase in the fat, especially in the mammæ, in the gluteal region, on the thighs, etc (Biedl).

Asthenial Universalis.—Hypoplasia of the ovaries may represent only one of the symptoms of a constitutional anomaly for which it is not responsible. This is not infrequently found as a part of a general condition in patients who have a tendency to enteroptosis, movable cecum and sigmoid, a lack of fat on the large labia, a large distance between clitoris and urethra, narrow, short vagina, a lack of well-developed fornices, malposition, rudimentary uterus or infantile or fetal uterus (cervix longer than the corpus), various degrees of double or divided uterus, small ovaries, narrow pelvis, persistence of fine hair on the lips, and diminished trichosis of the axilla. There is frequently dys-

menorrhea. There is often fluor albus. There is a tendency to vaginismus, often sterility, and a resulting psychic depression. There is decided asthenia.

Hypophysis.—The interrelation between the hypophysis and ovary is very intimate. Cases show imperfectly acquired secondary sexual characteristics when the hypophyseal lesions antedate puberty, and a resultant amenorrhea, with retrogressive sexual changes, when the malady develops after adolescence. As a result of preadolescent castration, reproduction is impossible and the acquired characteristics of sex fail to appear. In the ovary there are two, and possibly three, glandular elements. The process of ovulation, the interstitial cell body, and the corpus luteum of pregnancy. The reproductive function may not be impaired, even though full secondary sexual characteristics have not been acquired. The glandular element, which is responsible for the physical changes of puberty, is probably a function of the interstitial cells, and differs from that which is concerned with ovulation. The relation of hypophyseal disorders of overfunction or underfunction to physiologic activities of the ovary, *other than those concerned* with the acquirement of adolescent characteristics, is very close, and amenorrhea is an early symptom, with overfunction or underfunction.

When hypopituitarism dates from the adolescent period there occur other changes than failure of full development of the long bone. There occurs in the male a feminine disposition of the adiposis, the males possess a feminine type of skeleton with broad pelvis, there are small and delicate extremities, there is the tapering type of hand. In hypopituitarism there is a certain undefinable facial resemblance, due to maxillary prognathism, while in acromegaly there is mandibular prognathism.

SKIN AFFECTIONS AND THE INTERNAL SECRETIONS

Goltz divided the spinal cord of the female dog, and the animal went through all the phenomena of heat, pregnancy, lactation, etc. This showed that it was not through the nervous system, but through the channel of the circulation that the various processes related to puberty and pregnancy take place. The

thyroid, the adrenals, the ovaries, the hypophysis, and the other glands act to some extent in harmony, to some extent in opposition, to each other. In diseases one may take up the function of the other, or they may all unite in a common action against certain products, some or all may be affected in like or varying degrees by infections or by toxic substances.

Politzer's conclusions are of great interest and are substantially as follows: Certain involvements of the skin occur during pregnancy and disappear on termination of pregnancy. There are certain dermatoses of puberty, of menstruation, of pregnancy, and of the climacterium. Some of the skin annoyances of pregnancy may depend on the cessation of ovarian function and the cessation of menstruation during that time, or they may be due to the influence of the corpus luteum or of the placenta.

At puberty there is a great change in the skin; there is a special increase in the adipose tissue characteristic of the female; there is a growth of hair in the pubic and axillary region. Acne may be considered as related to the sexual apparatus only in so far as the establishment of puberty physiologically brings about local circulatory changes in the skin of the face, which renders the latter a more favorable soil for the development of the special micro-organisms of acne.

The regular monthly hyperemia of menstruation may occur in any part of the body, and cause dilation of the blood-vessels in any part of the body, may cause changes in any of the skin diseases, or altered skin conditions, which are present in face and elsewhere. Simple erythema and the various forms up to erythema nodosum may occur regularly before, during, or after menstruation, and is often associated with menstrual irregularities. Cases of purpura in connection with menstrual irregularities may be regarded as due to pathologic processes in the skin of a more intense nature than those which cause erythema.

Urticaria and angioneurotic edema may be related to menstruation. Menstrual urticaria may appear at regular intervals with each monthly period; in other cases it occurs only with menstrual irregularities, such as amenorrhea. The angioneurotic edema not infrequently occurs in definite relation to menstruation; they may be anaphylactic phenomena. The most frequent skin

disorder related to menstruation is herpes. One woman in twenty suffers from frequent or habitual menstrual herpes, occurring on the external genitalia or in the sacral region or the face, especially the lips. It is probably a toxemia of ovarian origin.

Hypertrichosis (excessive development of hair), more or less over the entire surface, but especially in the face, is pathologic; it is commonly associated with ovarian disorders. Disturbances in the function of the ovaries produce changes in the suprarenals and hypophysis. Temporary cessation of ovarian functions during pregnancy causes increased secretion of the hypophysis and adrenals. Hypertrichosis has been said to be due to the excessive function of the hypophysis and adrenals. Hypertrichosis of puberty, the hypertrichosis of ovarian disease, and the hypertrichosis of the climacterium are due to inadequate ovarian secretion acting in this manner.

Hyperpigmentation at puberty, during pregnancy, and with ovarian disease is not infrequent. Chloasma gravidarum occurs in three-quarters of pregnant cases. It is possible that the ovarian secretion produces secondary disturbances in the function of the adrenals.

Herpes gestationis is a severe disease, characterized by an eruption of more or less extensively distributed grouped lesions, made up mainly of vesicles and bullæ accompanied by intense pruritus. The disease is dependent on pregnancy, and promptly disappears when the uterus is emptied.

It has been suggested that the pruritus, urticarias, and dermatitides of pregnancy are due to the same agents that cause hyperemesis, nephritis, hepatitis, and eclampsia; namely, anaphylaxis brought about through absorption of foreign proteids from the placenta. Some cases of dermatoses in pregnant women have been relieved by the injection of 20 c.c. to 30 c.c. of serum from the blood of healthy pregnant women.

The dermatoses of the climacterium, so far as they are related to the genital system, are of the same kind and nature as those occurring with anomolies of menstruation and are dependent on altered ovarian secretion. At any rate "reflex" has nothing to do with these cases of skin involvement.

Knauer transplanted the ovaries of rabbits and dogs between the fascias of the abdominal wall and into the mesometrium, being careful to remove absolutely every bit of ovarian structure. In the abdomen he fastened the ovary with two sutures between folds of peritoneum, the ovaries being then nourished through endosmosis or through plasmatic circulation. New vessels grew into the ovarian tissue and furnished its subsequent support; this change began as early as the fourth day. Examination at various periods showed that a small part of each ovary usually degenerated, and new connective tissue appeared in the place of the lost cells. In all cases in which a complete degeneration of the ovary occurred, atrophy of the breasts and of the genitalia was found. The muscle of the uterus was atrophied, the intermuscular connective tissue was increased, the mucous membrane was atrophied—changes like those which occurred after double castration. Retention of function on the part of the transplanted ovaries was always evidenced by the growth of follicles in a normal manner, by the ripening of the follicles, and by the discharge of the ova. In all such cases the normal character of the breasts, of the uterus, and of the genitalia was preserved, and in the younger animals all these organs underwent a natural development.

Knauer's results proved that the preservation to the organism of functionating ovaries preserved the breasts, the genital organs, and the sexual instinct. This result occurs through the absorption into the circulation of ovarian secretion. This internal secretion reaches the blood through the lymph-channels. The trophic function which the ovary exerts upon the body stands in closest relation to its ability to form ripe ova. Ovarian tissue which has ceased to develop ripe ova has lost its secretory function.

The normal human ovary produces and expels ova capable of being fecundated. Ovulation, as a rule, occurs from four to eight days before menstruation, but it may occur at other periods,

as ripe ova, practically speaking, may be present at almost any time. In the intermenstrual period follicles ready to burst are present. Ovulation may occur during pregnancy. The relatively frequent occurrence of pregnancy during the temporary amenorrhea of lactation is a proof of ovulation during this time.

Ovulation and menstruation are both the result of the secreting function of the ovary and are not related as regards cause and effect. Menstruation occurs only after the ovary is capable of producing ripe ova.

Ovulation and menstruation are evidences of the functional capability of the ovary. Ovulation may occur without menstruation, but the latter never without the former. We have here an evidence that functional secretory activity of the ovary is necessary to stimulate the mucous membrane of the uterus to its periodic changes. The part which the ovaries play in the development of the body, the effect of their influence upon the breasts and the genital tract, at puberty, before each menstrual period, at the menopause, and after castration, are proofs of their secreting power. The experiments of Knauer and others show that it is simply the presence of ovulating ovaries and the absorption of their secretion which are of importance to the body, and that their action upon the uterus is in nowise reflex in character since, when removed and implanted elsewhere, and in this way loosened from direct connection with nerve-plexuses and the nervous system, every sexual peculiarity is absolutely preserved.

Menstruation is a periodic loss of blood from the lining of the uterus. Menstruation implies a regular congestion produced by the ovaries acting on a uterus of such a structure and containing such a lining that the congestion is relieved by the bursting of capillaries and the outflow of blood. Menstruation implies functionating ovaries, a developed uterus, a normal or fairly normal state of the blood, and an open unobstructed canal from the uterus through the cervix, vagina, hymen, and vulva.

Definition.—Amenorrhea means an absence, a too late beginning, a temporary cessation, or a too early permanent cessation of the menstrual function. It is, therefore, of two forms. The first or primary form is that in which menstruation is not yet established; the second is the secondary form, in which men-

struation ceases after having once been regularly evidenced, whether the cessation is temporary and lasts for months or years, or whether it is permanent, as in early menopause or climacterium præcox. Amenorrhea may be relative or absolute. Relative amenorrhea implies that menstruation is extremely slight, while absolute amenorrhea means that no blood is lost at all.

Primary Uterine Hypoplasia.—There may be an absence of the uterus, with or without the presence of ovaries, for which embryologic causes may be at fault. General hypoplasia of the vascular system is a cause of insufficient development of the genitalia. Forms of uterine subdevelopment occur, associated with general hypoplasia. Winckel has shown that, in the development of the uterus and tubes, the situation of the Wolffian body close to the ducts of Müller may influence, to a very great degree, their growth, and is a frequent cause of malformation. The early completion of the Wolffian bodies, their opening into the sinus urogenitalis, the growth of the Müller's ducts along the Wolffian, and their crossing at that spot where the union of Müller's ducts finds its upper limit, are anatomic embryologic factors easily recognized as causes of uterine maldevelopment and hypoplasia. Further, the origin of the ligamentum ileo-genitale rotundum at this upper limit, its close union with the ducts of Müller, the fact that its line of development in a measure opposes the union of the ducts, in addition to tension, pressure, and torsion exerted by the neighboring organs, such as the Wolffian bodies, the bladder, the ureters, the vessels and nerves of the uterus and rectum, are important factors influencing the development of the uterus. In addition, Winckel recognizes the occurrence of abnormal cells in the septum between the ducts of Müller, and general hypoplasia of the vessel system, as additional causes of maldevelopment.

Secondary Uterine Hypoplasia.—Aside from the embryologic causes here mentioned, the forms associated with general hypoplasia and secondary atrophy resulting from constitutional diseases, we recognize in the ovary and its secretion the factor which governs the development of the uterus, the genitalia, and the breasts, and the factor which is concerned in the preservation of these organs and the regulation of menstruation. In castrating

young guinea-pigs the breasts are later found to be one-fourth the normal size, the genitalia are small, the vulva is one-third smaller than normal; the uterus is as small as at birth, showing very slight development of the muscle and endometrium, and containing no ciliated cells. The breasts show no glandular tissue, the mammillæ are hypoplastic.

Poorly developed ovaries are the result of failure of development of the body in general, or represent a failure of development of the ovary itself through embryonal disturbances. Diseases of children, such as scarlatina, measles, mumps, diphtheria, typhoid, etc., are not rarely the cause of eruptive, hemorrhagic, or necrotic involvements of the vagina, uterus, tubes, and ovaries. The ovarian or uterine involvement may be of such a degree of severity as to interfere with the development of the uterus and of the ovaries. If the energy and development of the ovaries is interfered with, it must of necessity result in an under-development or hypoplasia of the uterus and tubes. Recent knowledge in the field of the function of the hypophysis shows that the relation between this gland and the ovaries is very close. Diseases of the hypophysis, whether due to tumor or to functional disturbances, whether these result in hyperfunction or hypofunction, have a decided tendency in the preadolescent period to so markedly involve the ovaries that these in turn fail to exert their proper trophic influence on the genitalia. We recognize in the ovary and its secretion the factor which governs the development of the uterus, the genitalia, and the breasts, and the factor which is concerned in the preservation of these organs and in the regulation of menstruation. The absence of ovaries, a poor development of these glands, and insufficient secretion of ovarian substance, or a diversion of ovarian secretion to other organs of the body, always causes a total or partial or relative failure of uterine development, or causes uterine atrophy. There may be a uterus fœtalis, a uterus infantilis, or a hypoplastic uterus.

Hypoplasia is of two kinds—concentric, the severe form; and eccentric, usually temporary. It may be taken for granted, if the ovaries on examination are found to be present and large and if molimina menstrualia occur, that the ovaries are not at fault, but that the condition is due to embryonal causes mentioned

by Winckel, or to a general hypoplasia or to direct involvement of the uterus by constitutional diseases.

Amenorrhea of Chlorosis.—Amenorrhea is frequently a symptom of chlorosis. It seems to be related to a temporary functional inactivity on the part of the ovaries. Chlorosis is an illness occurring exclusively in girls, most frequently during the years of development and the years immediately following, and showing a tendency to recur. It develops spontaneously without evident cause, and has no connection with conditions relating solely to nutrition, since its occurrence among the better classes is very frequent. It affects directly only the condition of the blood, without causing constitutional degeneration and without great injury to the general nutrition. No theory with regard to chlorosis which leaves out of consideration its occurrence in girls only, at the time of, or in connection with, sexual development deserves attention. It occurs most frequently between the fourteenth and twentieth years. According to Niemeyer, such cases as occur for the first time after the twenty-fourth year are almost never chlorosis.

Von Noorden believes the stimulation which the ovary exerts upon the blood-forming centers to be one of its important functions. This action is not exerted reflexly, but through the channels of circulation by means of the ovarian secretion. In chlorosis there is often associated a poor development of the genitalia. The pelvis in a certain proportion of cases is of the child's type; in others there is poor development of the external genitalia, or a uterus infantilis, small ovaries, poorly developed breasts, etc. Seventy-four per cent. have failure of genital development of one form or another. Among non-chlorotics these conditions are found in only 20 per cent. Menstruation is, as a rule, disturbed. During the chlorosis there is a very frequently absolute or relative amenorrhea. Those affected with menorrhagia always show a decided change in the mucosa. In all, 77 per cent. show a weakening of the menstrual function.

Amenorrhea of Obesity.—In the case of poorly developed ovaries menstruation, if present, is often irregular and weak, but may eventually become well established or may cease. Although these persons may be well developed, yet they may show poorly developed genitalia. In connection with small ovaries is found a

small uterus, the breasts being well developed but containing little glandular tissue. There is a tendency to fat, which distinguishes these individuals from those with well-developed genitalia.

Amenorrhea is not infrequently associated with obesity or lipomatosis universalis. In such cases a small under-developed uterus may be found. As a matter of fact, in all these cases obesity is partly the result of the failure of sufficient ovarian secretion. The amenorrhea and the uterine hypoplasia are evidences of this failure. Coincident with failure of ovarian activity is a probable diminution in the activity of the thyroid gland. The resulting diminution in metabolism produces the obesity. Von Noorden classifies obesity as follows:

1. Obesity due to the ingestion of fattening foods. The oxydation-energy is normal, the cause of the obesity being a disproportion between the intake and the output.

(*a*) Overfeeding obesity (immoderate use of foods and drinks).

(*b*) Sluggard's obesity (insufficient muscular exercise).

(*c*) Combination of the factors *a* and *b*; a very common type.

2. Thyreogenic obesity (diminished oxidation-energy), in which the proportion between the intake and the bodily functions may correspond to the normal average, but the condition is frequently complicated and strengthened by factors such as mentioned under *a* and *b*.

(*a*) Primary thyreogenic obesity (based upon independent changes of the thyroid gland).

(*b*) Secondary thyreogenic obesity. The hypofunction of the thyroid gland in the last group of cases is determined by the remote effect of other organs, such as the pancreas, the hypophysis, the suprarenal bodies, the thymus, the genital glands; these conditions not being very well elucidated at the present state of our knowledge.

Another one of the internal glands is now recognized as having an all-important bearing on the question of amenorrhea, especially when associated with obesity. Hyperfunction of the hypophysis, anterior lobe, causes skeletal overgrowth and tends to sexual dystrophy. Hypoactivity of the anterior lobe causes failure of development of the bony system (dwarfs, etc.) and the secondary sexual characteristics. Hyperactivity of the posterior

lobe causes lowered nutrition. Hypoactivity of the posterior lobe means altered metabolism, so far as the carbohydrates are concerned, and a more or less general adiposity. So marked is this adiposity, and so characteristic is the sexual alteration which is associated with it, that to this condition is given the name dystrophia adiposogenitalis.

Vicarious Menstruation.—The constitutional element in the process of menstruation sometimes results in the occurrence of vicarious menstruation. Under this designation we consider bleedings occurring at regular intervals in a patient suffering from uterine amenorrhea. The most frequent spot for this bleeding is the nose, usually the lower turbinated bones.

Some cases may be due to uterus rudimentarius, with or without the absence of the adnexa of one side. The uterus is small and may possess no cavity. Such cases and cases with vaginal defects may have vicarious menstruation from the nose at regular intervals for months. The mammæ and external genitalia are small; the patients may suffer from molimina menstrualia every three or four weeks for periods of several days. Eventually severe pain is experienced, constantly associated with nausea and vomiting. Severe molimina menstrualia, sickness of the stomach, and rectal bleedings may furnish the indications for operation. Since no bleeding takes place from the endometrium, the ovarian secretion through cumulative action is responsible for the severe pain. After castration all the annoying symptoms disappear.

Very young children with well-developed pubis and breasts have suffered from periodic bleedings of the nose. Older well developed girls may suffer from regular bleedings from the nose, which stop, however, when real menstruation begins. In rare cases there are nose bleedings at regular intervals, which stop during pregnancy, only to begin afterward, and after a continuation of several months cease again on the occurrence of a second pregnancy. Bleedings have been described as occurring regularly from other mucous membranes, the trachea, the lungs, and the stomach. In the latter instance the bleedings were not always associated with vomiting, the blood being usually found in the feces. In other cases there are bleedings into the thyroid gland.

In cases with poorly developed uteri these bleedings disappear when the uterus begins to functionate properly.

Amenorrhea of Atresia.—Amenorrhea is due to a primary constitutional or to a primary local cause. The latter is frequently overlooked.

An atresia may involve the hymen or the vagina. This condition has been generally viewed as congenital. The investigations of Neugebaur, however, show that among the reported cases of stenosis or atresia one-third are congenital and two-thirds are acquired. The investigations of Nagel and of Veit show that an atresia vaginæ, when the uterine canal is normal, is usually an acquired lesion. When there is a maldevelopment of the vagina and a congenital absence of its lumen, then the uterus is also found to be maldeveloped and two-horned. Piering divided the causes of acquired stenosis and atresia into traumatic, inflammatory, chemical, and thermal.

In children various degrees of atresia, stenosis, and changes in the hymen may occur as congenital alternations or as a sequence of gonorrhea, of the milder forms of vulvovaginitis, or with and after the various infectious diseases, most frequently after typhoid fever and scarlatina. Any irritation, as enuresis, may cause excoriation with a conglutination of the hymen. Such conditions often obtain in the newly born and are not recognized. A conglutination may occur through the excessive size of the hymen and constant rubbing. A congenital conglutination of the hymen often breaks spontaneously, but, if acquired, is tenser because of the union of thicker hymen folds. Weak and anemic children are more disposed to milder forms of vulvovaginitis than other children. The presence of milder forms of vulvovaginitis is often overlooked, while the failure of treatment in other cases is likewise a responsible factor in producing future annoyances. In infectious diseases there is often a colpitis adhesiva without symptoms.

The lesions produced by infectious diseases in children include vulvovaginitis. The first menstruation with acute infectious diseases, especially if amenorrhea follows later, is often due to an affection of the vulva or vagina accompanied by a loss of epithelium, by bleeding, by the presence of ulcers, and easily by subsequent adhesions. The so-called menstruatio præcox is often

only such a vulvovaginitis. Scarlatina especially may cause thrombotic necrotic processes in the vagina. We know that various forms of atresia may occur in adults, even in multiparæ, as a result of a colpitis adhesiva or as a result of ulcerations accompanying fluor, or leukorrhea of gonorrheal origin, if no menstruation or coitus take place, and that too without ulcerations and without annoying preliminary symptoms.

Some of the results of atresia are more far-reaching than generally known. The occurrence of a hematocolpos with an atresia can be readily understood. The occurrence of a hematosalpinx, however, is one not so easy of comprehension. This condition, in a large proportion of cases, is of a dangerous character. Scarlatina, and especially gonorrhea, produce local, often neglected affections which cause atresia and also a salpingitis with closure of the tubes. Typhoid fever, scarlatina, and measles may produce, without symptoms, an atresia, and the affection may extend through the cervix and uterus into the tubes, with closure of the latter.

Diagnosis.—If no menstruation has taken place up to the sixteenth year, subdevelopment of the body, hypoplasia of the uterus or ovaries, or chlorosis or obesity must be taken into consideration. If no menstruation takes place up to the eighteenth or nineteenth year, an atresia of the hymen or vagina is one of the possibilities. Attention is rarely called to this condition in girls under sixteen years of age. When observed, it is usually noted between the eighteenth and the nineteenth years, because of the pain that is often felt at regular intervals. In other words, the menstrual function is carried out, but the exit of blood is prevented by the atresia. If examination excludes this involvement, which is sometimes congenital, but more frequently acquired as a result of vulvovaginitis due to the infectious diseases of childhood or to gonorrhea, either failure of development of the genitalia is present or else under-development of the ovaries, uterus, or both is to be found; that is, we are dealing with some form of hypoplasia. Degrees vary between absence of uterus, uterus fœtalis, uterus infantilis, and hypoplastic uterus. It is important to measure a small hypoplastic uterus when made out by bimanual examination. A uterus may be small and yet the sound may show the cavity to be of normal length, which speaks then for a thin muscular wall.

If the uterus is small and the sound shows the cavity to be shorter than normal, this form of hypoplasia is of profounder meaning. Diagnosis and prognosis depend on the character of molimina menstrualia. *Molimina menstrualia* comprise the pain and sense of weight felt in the pelvis and back, and sometimes in the region of the ovaries, at regular four-weekly intervals. If there are slight or no menstrual molimina, the blame for the amenorrhea rests wholly or in part with the ovaries. If menstrual molimina occur, the ovaries evidently functionate and produce a periodic congestion, but the uterus is then of such a size and character that the exit of blood does not occur. Bimanual examination made through the rectum with the aid of a catheter in the bladder is sufficient to show the existence of a uterus and to demonstrate its size. If there is amenorrhea, or if in place of the normal menstruation vicarious hemorrhage occurs (urethra, rectum, lungs, stomach, mouth, nose, and eyes), it is necessary to think of an atresia of the genital canal. If an atresia is present, it is possible that, as a result of hemorrhage into the tube, a hematosalpinx is also present.

Secondary Amenorrhea

Amenorrhea may occur after regular menstruation has once been established and is due to altered blood state, altered metabolism, altered ovaries and uterus, or to pregnancy or lactation.

Amenorrhea Due to Blood States.—Infectious diseases, by lowering the vitality of an individual and causing an anemic state, may be the responsible factor for amenorrhea. It is noted that after typhoid fever, scarlatina, etc., menstruation may cease for varying periods of from three to six months or more. In such cases a newly formed atresia of the vagina must be excluded, for we know that ulcerative and degenerative changes may be produced in the genital mucosa by infectious diseases. Beginning pulmonary tuberculosis is also a cause of amenorrhea, and the latter is frequently one of the very first symptoms. The differential diagnosis from chlorosis must be made. Acquired or secondary amenorrhea also results from involvement of the blood state in chlorosis, or leukemia. In the former we are dealing with a disease usually present during the developmental and adolescent

period of life. It is a condition which usually occurs between the fourteenth and twentieth years and almost never occurs for the first time after the twenty-fourth year. Chlorosis is a disease which is almost never found in men. For these reasons the amenorrhea of chlorosis probably bears some relation to the secretory activity of the genital glands.

Amenorrhea Due to Involvement of the Ductless Glands.—Involvement of the various ductless glands is not a rare cause of amenorrhea. Cessation of menstruation may occur with Addison's disease, with acromegaly, and especially with myxedema and Basedow's disease. This latter disease is most frequent in women, and presumably so because of the delicate balance which exists between the ovaries on the one hand and the thyroid gland on the other. Given, then, a hypersecretion of the thyroid, it is only natural to reason that the function of the ovaries is either primarily or secondarily inhibited. The thyroid and ovarian secretions are to a certain extent antagonistic. In myxedema, on the other hand, we have a diminution of thyroid function, and perhaps a parallel diminution of the ovarian secretion. Myxedema produces such an alteration in tissue metabolism as to naturally affect the activity of the various glandular organs, among which the ovaries and the uterus are of importance.

The hypophysis is a gland composed of an anterior and a posterior lobe. The hypophysis may secrete too much, it may secrete too little. It is a strange thing that with either hyperactivity or hypoactivity of the hypophysis there is involvement of the ovaries, and consequently diminished menstruation or absolute amenorrhea. In every case of amenorrhea an involvement in the form of acromegaly, due to overactivity of the anterior lobe in adults, or obesity associated with diminished function of the posterior lobe, should be looked for. In other words, when these conditions develop in adults, regressive changes occur in the ovaries and uterus and menstruation diminishes or may cease.

Amenorrhea Due to Ovarian Atrophy.—Acute infectious diseases act on the ovaries, in some instances producing ovarian and uterine atrophy. Marked involvement of the secretory activity of the ovaries results in uterine atrophy. Such ovarian and

uterine atrophy may also occur as the result of puerperal fever. Exudates about the uterus, too, may interfere with its blood-supply and result in atrophy of the uterus.

While not of frequent occurrence, diabetes may be responsible for the occurrence of amenorrhea, by causing atrophy of the ovaries and then of the uterus. Another cause of ovarian atrophy with resulting amenorrhea, and one which is not generally known, is the prolonged use of opium. On the authority of Olshausen, it is an influential cause in the production of ovarian secretory inactivity and structural atrophy.

What parts of the ovary produce secretion? We know little about the secretion of the follicles, yet they probably nourish the uterine lining. Some say that the corpus luteum interferes with ovulation, and in this way prevents the interruption of pregnancy. L. Fraenkel says that the corpus luteum in cycles produces the impulse of nutrition in the uterus which prevents it from undergoing atrophy. When an ovum begins to grow the yellow body furnishes still more nourishment to the uterus.

The uterine lining is acted on by the ovaries, probably by the follicle secretion. The lining reacts on the ovaries, too, for if the uterus is removed ovarian secretion gradually diminishes, and ceases ofttimes at the end of two years or more. The lining of the cervix and uterus and their hormones react on the ovary. When the ovum comes it stimulates the ovary to the production of the corpus luteum, and the corpus luteum stimulates still further the decidua and uterine growth. We are certain that the relation of the thyroid to the ovary sensitizes the thyroid gland, and that the relation between uterine lining and ovary sensitizes the ovary. This, coupled with the various changes in balance which occur at puberty, menstruation, etc., is responsible for the instability which produces the various nerve phenomena due to hypersecretion or hyposecretion, or variations between the two, which make women the weaker sex.

The ovary, especially the corpus luteum, produces a hormone which, united with the usual vital processes, causes decidual cell growth. In the second period of its existence it prevents ovulation. Its persistence during pregnancy is due either to the embryo or to the placenta. The integrity of the uterus, perhaps,

depends on the functions of the follicles. The function of the corpus luteum is to promote the nesting of the egg. The secretion of the "interstitial part" which may perhaps control the vasomotor apparatus is not definitely known. Bouin believes in a functional relationship between the corpus luteum and the interstitial gland. Biedel thinks that the interstitial gland controls the cyclic changes in the genital canal.

In cases of uterine atrophy there are usually anatomic or clinical evidences of a hypofunction of the ovaries, such as small ovaries, atrophy of the ovaries, a failure of ripening of the follicles, degenerative changes in the follicles, inflammatory processes, and so on. The absence of molimina menstrualia speaks for like processes in the ovaries and uterus.

Although primary atrophy of the uterus may exist, most of the atrophies depend upon a primary injury to the ovaries.

Under physiologic atrophy belong senile involution and the so-called lactation atrophy.

Infectious diseases produce changes on the ovary and a weakening of the entire system. These ovarian changes are produced by diabetes, Basedow's disease, myxedema, psychoses, anemia, and poisons, such as morphin (especially), lead, mercury, phosphorus, and arsenic. The most important symptom of atrophy of the ovaries is amenorrhea. Other symptoms are sterility, fluor albus, pain in the back, etc. The general symptoms are headache, loss of appetite, palpitation, fatigue, and melancholic depressive conditions. The severe climacteric annoyances, such as are seen after castration or in the climacterium, especially the vasomotor symptoms, do not predominate with lactation or other atrophies. This may be due to the fact that some ovarian activity still persists, or else that that part of the ovary which protects these functions is intact and there is simply a disturbance of the follicles apparatus, thus producing amenorrhea and sterility. Among the drugs of value are Santonin and Johimbin.

Climacterium Præcox.—Menopause occurs likewise in younger women, and is due to an early cessation of ovulation and functional activity on the part of the ovary, and is therefore an early senescence. Such a climacterium præcox usually implies

an early atrophy of the uterine genitalia, often going hand in hand with increasing obesity. In some instances ovulation may continue.

At and after puberty we judge the vitality of the ovary by its ability to bring its ova to a stage which may be called ripe. For the expulsion of an ovum from the Graafian follicle, a gradual increase in size of the follicle takes place, depending partly on an increase in the amount of the liquor folliculi. The opening which serves as an outlet for the ovum is probably the result of the reaction or chemical effect produced by a normal ripe ovum. In those cases of young children with well-developed breasts and genitalia in whom menstruation begins, there is an unusually strong development of the body, and the ova as well as the follicles differ in no way from those found in menstruating adults. In the newly born and in children, follicles of the same size and even larger ones exist without bursting, the so-called *atresic follicles*. These ova and follicles go through the same stages of development as in the case of adults. That they are not capable of fecundation is shown by the fact that the ova are only one-half as large as in adults. Unbroken, persisting, or atresic follicles may occur at various ages in adults. Larger follicles and follicle cysts occur in the ovary without opening. In women in whom the follicles do not open, but do degenerate, cessation of menstruation may occur as a result of the so-called missed ovulations. These facts speak for a chemical or enzyme power in only the normal, ripe, energetic ovum.

Amenorrhea of Obesity.—Relative or absolute amenorrhea even before the age of thirty may occur gradually, without marked symptoms, often in patients who grow fat. It is probably due to early involution of the ovaries, and if absolute is called climacterium præcox. Obesity is viewed by some as the result and by others as the cause of the amenorrhea. In this amenorrhea of obesity we distinguish two classes: the phlegmatic and the excitable type. Probably an involvement of the ductless glands is in a great measure responsible for this condition. We are concerned here mainly with the activity of the ovaries and of the thyroid. A diminution in the secretory activity of the ovaries and of the thyroid diminishes tissue metabolism, and it is only natural to expect as a result thereof accumulation of fat and a gain in weight.

When the ovarian and thyroid secretions diminish in equal degrees so that the balance between the two is of the same nature as in the normal woman, the phlegmatic type of obesity results, and a condition in some degree comparable to myxedema is the consequence. If there is a diminution of ovarian and thyroid activity, and the ovarian activity is so diminished that a relative degree of thyroid hypersecretion exists, we have, in addition to the increase in weight, an excitable condition due to the relative hypersecretion of thyroid extract. In other words, we have a condition of excitability much resembling the annoying symptoms often associated with the climacterium or with the menopause consequent on double oöphorectomy. Climacterium præcox, therefore, follows more or less the types observed at the menopause, and the obesity may be referred to the same cause.

Reference has been made to the association of the hypophysis gland with amenorrhea and also with obesity. The amenorrhea is due to the fact that the trophic relationship between hypophysis and ovary is so marked that each acts upon the other; involvement of the ovaries may influence the hypophysis, but more certainly than this involvement of the hypophysis affects the ovaries; involving ovarian secretory functions, and through them, or directly through its effects upon the uterus, influencing the nutrition of that organ, thus markedly affecting menstruation or causing it to cease. Diminished activity of the posterior lobe, in particular, can be reconciled with trophic involvement of the uterus and ovaries, when we realize the effect which pituitrin may have, especially on the pregnant uterus. Diminished activity on the part of the posterior lobe, however, which is closely related to this question by its influence on carbohydrate metabolism, can be readily understood to result in failure to burn up the carbohydrates, with a resultant accumulation of fat. Hence, any case of progressive general obesity associated with atrophic changes in the genitalia must be considered as a possible case of hypophysis obesity, extreme cases of which are known as *dystrophia adiposogenitalis*. There is no doubt that some cases of obesity are due to ovarian inactivity, that some are of a myxedematous type and due to diminished thyroid activity, that many are of the

hypophysis type, and that probably a large number are due to an involvement which includes failure of function in more than one of these three glands. There is a form of obesity, too, due to involvement of the pineal gland, and possibly also some cases which have been described are due to adrenal involvement, but in these types atrophy of the genitalia does not result; on the contrary, there is usually found what may be called hypergenitalism.

Amenorrhea of Castration.—Knauer found, after castrating rabbits, that the uterus atrophied and that the intermuscular connective tissue was increased. Sokoloff castrated dogs and found that the uterus, especially the circular layer, became atrophied, the vessels were thickened and their lumen smaller. Jentzer and Beuttner, on castrating cows, found an atrophy of the muscle and of the glands of the uterus, an increased growth of the connective tissue, and changes in the stratum vasculare.

One year after castration the uterus is atrophied, the endometrium likewise, the connective tissue is increased. There is atrophy of the cervix, an atrophy of the corpus, a sclerosis of the vessels, which show a growth of the intima, and an endarteritis obliterans, especially in the larger vessels. Few glands are present and the connective tissue is increased. After castration, the changes are like those occurring at the menopause. The removal of the ovaries diminishes the excretion of phosphorus. Less carbonic acid is given off and less oxygen is absorbed. The body-weight increases. The diminution in the excretion of phosphorus after double oöphorectomy explains perhaps the value of this operation in osteomalacia.

Amenorrhea of the Climacterium.—The presence of normal ovaries preserves uterine muscular tone. The ovarian secretion exerts a trophic stimulation upon the uterus and an influence which produces, during the fertile period, those regular painless uterine contractions which have the effect of auto-massage upon the uterus and which preserve its muscular tone. In ovarian changes at the climacterium the muscular wall and the mucosa atrophy and periodic pelvic congestions do not take place. At and after menopause, as a result of normal involution of the ovaries, the uterus undergoes regressive changes, the portio shrinks, the

corpus atrophies, the connective tissue is increased, the vessels are sclerosed, the mucous membrane is thin, flattened, and indurated, and we have the so-called senile uterus.

Amenorrhea of Pregnancy.—Ovarian secretion produces a general congestion, most marked in the pelvis and uterus. If this secretion be opposed by an added secretion which antagonizes and nullifies it, then the menstrual congestion fails to occur. In pregnancy we are dealing with a fecundated ovum. A fecundated ovum settles into the decidua by dissolving the cells about it and boring a hole for itself whereby it sinks into the decidua. This is accomplished by the enzyme products of the fecundated ovum. The trophoblast or outer layer of this ovum has a destructive action on maternal tissues and is held in check by elements contained in the maternal blood. These fetal cells are at all periods of gestation given off into the maternal circulation and constitute a fetal or placental secretion. There exists probably an antagonism between the ovarian secretion, on the one hand, and the enzymes of the fecundated ovum on the other. Hence in pregnancy we may assume the amenorrhea to be due to the fact that the pre-menstrual congestion usually produced by the ovarian secretion is nullified by the opposing enzymes of the fecundated egg. A curious paradox is furnished by the case of a woman who has not menstruated for years except during the first three or four months of several successive pregnancies.

Amenorrhea During Lactation.—Ribbert implanted the mamma of a young guinea-pig, with its covering of skin, into a cut near the ear. The wound healed, and five months after the operation, the animal having borne two young, this mamma secreted milk normally, a proof that the connection between the breasts, and the ovary and uterus is to be found at least partly through the channels of the circulation.

Goltz cut through the cord of a dog at the level of the first lumbar vertebra, and later saw signs of rut appear. After coitus one dead and two living young were born. The breasts were well developed and lactation and nursing followed the normal course. Since these changes, the sexual tendency, and the process of labor could not have been excited through the cord, it must be that a certain secretion of the ovary, acting through the medium of the circulation, gives the stimulus for the exercise of those functions.

After labor, lactation is probably stimulated in addition by the thyroid or some internal secretion. The ovarian secretion seems to exert no effect or less action upon the uterus; therefore the uterus rarely undergoes its periodic or trophic stimulation. Continued nursing causes continued contraction of the uterus. Menstruation does not take place and there is a natural tendency to trophic changes which end in lactation atrophy of the uterus.

Lactation Atrophy.—There are cases of amenorrhea which persist for varying periods of time, even after nursing is stopped, in women who have nursed their children for an unusual number of months. As a result of nursing there occurs a uterine atrophy which is normal up to a certain degree only. In many women bimanual examination and the use of the sound show that the uterine atrophy has gone beyond the normal. The atrophy which has occurred in the genital sphere may prevent the re-establishment of menstruation for varying periods of time.

Under atrophy of the uterus belong those cases in which the uterus was previously normal in size, with a cavity of normal length. The changes occurring in lactation atrophy are: (*a*) Eccentric, with a cavity of normal size but with a deficiency of muscular elements; (*b*) concentric, with a cavity smaller than normal. The former cases are not infrequently associated with small adnexa. It may be mentioned that the majority of nursing women who have a uterus under the normal size show all the evidence of poor nutrition, and especially laxity and flabbiness of the general body structures. In "prematurely aged women" lactation is poorly borne. It is in these cases that Frommell finds the greatest amount of uterine atrophy, and he supposes it to be an evidence that nursing deprives the body of a large amount of nutrition.

Thorne considers lactation atrophy to be a reflex trophoneurosis, and believes that every nursing amenorrheic woman has a hyperinvoluted uterus, without, however, an involvement of the ovaries. He acknowledges the frequency of anemic conditions associated therewith, but observes that those cases menstruating during nursing show no atrophy of the uterus. This associated menstruation is an evidence of sufficient ovarian stimulation, and of course the uterus does not atrophy.

Amenorrhea Due to Curettage.—A very thorough curetting

of the uterus is not infrequently followed by a temporary or permanent cessation of the menstrual function through uterine atrophy. In some instances there occurs a union of the anterior and posterior uterine walls, so that an atresia of the uterus results. In other cases a too thorough curetting has produced a rapid involution of the ovaries and uterus, but in just what way is not definitely known. The same annoying conditions have been noted after a too deep cauterization of the uterine cavity by steam by the method known as atmocausis.

Atmocausis.—Czempin reported a case treated by atmocausis in which menstruation did not recur and the patient suffered from symptoms of climacterium præcox. The uterus was found to be small and hard, the cervix was obliterated by cicatricial adhesions.

Weis atmocauterized a nullipara. No menstruation occurred and the patient suffered with headache and bleeding from the nose. Several months later the uterus was found to be small, hard, and shrunken; the cervix was closed by cicatrices and a sound could not be passed. Two months later the cervix was passable by a sound, but for a distance of only 3 cm. The body of the uterus was flat and shrunken. Atmocausis is often purposely used with the idea of destroying the endometrium and of causing an obliteration of the uterine cavity. (See Atmocausis.)

Amenorrhea Due to Nervous or Mental Conditions.—A change of climate is noted as a cause for temporary cessation of menstruation. In other instances shock, psychic excitement, or mental disease produce amenorrhea of shorter or longer duration. The amenorrhea is probably the result of some alteration of metabolism, and is to be referred in some cases to functional involvement of some of the ductless glands; among them, the ovaries. Koblanck finds that in many cases of amenorrhea masturbation is practised. These include married women, many of whom have borne children. The duration of the amenorrhea varies from three months to several years. The tendency to masturbation is especially strong at the time for menstruation. Attracted by the observation of Fleiss, he noted that many disturbances in the menstrual function, especially dysmenorrhea, are associated with circumscribed swellings of certain nasal areas, namely, the anterior end of the lower turbinated bone and the directly opposite area of the

nasal septum. He found that this was produced by strong sexual excitement unaccompanied by the relief resulting from physiologic completion of this state. For the treatment of amenorrhea the stopping of the masturbation is a necessary factor.

THE TREATMENT OF AMENORRHEA

The treatment of amenorrhea is directed to the cause, and consists most frequently in improving the general physical condition and in producing increased blood-supply and hyperemia in the pelvis and uterus. Due regard must be paid to the special diagnosis of those cases dependent on diseases of the ductless glands. Basedow's disease and aberrant Basedow's disease demand, in addition to special treatment, the use of ovarin and antithyroidin. Incipient tuberculosis must be looked for and diagnosed from chlorosis. Among younger girls the conditions most frequently met with are chlorosis, obesity, and uterine hypoplasia. Chlorosis is to be treated by iron, arsenic, ovarin, etc. (See Puberty.) This condition of hypoplasia is frequently present in chlorosis and is very frequently present with obesity. The condition rights itself and menstruation is established in the vast majority of cases by methods which aid the natural development of the body and of the pelvic organs. Anything which aids this process is to be commended.

℞. Ovarin (Merck) ..... gr. iij
Arsen-hemol ..... gr. iss
Ferri sulph. exsicc. ..... gr. iij
Ext. cascara ..... gr. ss
Ft. tal. caps. no. xxx.
S.—One t. i. d. p. c.

℞. Liq. potassii arsenitis ..... ℥j
Ferro-mannin ..... ℥vj
M. S.—℥ij t. i. d. p. c.

Open-air exercise is essential; salt baths are valuable, but they should not be very warm. The diet should be generous and is to be restricted only in the case of very obese patients. In those younger unmarried girls in whom menstruation appears late or is irregular, the best combination consists of a capsule containing 4 grains of ferri sulphas, 1½ grains of arsen-hemol, and 3 grains of

ovarin, given four times a day for several weeks or months. Drugs which have stimulative action on the uterus and which may be given for long periods are salicylic acid, 5 grains, three or four times a day; and apiol, iv minims in capsules, several times a day. When possible, very hot vaginal douches should be ordered and continued for weeks. (See Hygiene of Puberty.)

The treatment of amenorrhea demands the production of a flow of blood toward the uterus. This may be done by bimanual massage of the uterus, if possible, by sea baths, swimming, and exercise. Hot prolonged douches should be used and warm sitz-baths (90° to 105°, ten to thirty minutes) and hot foot-baths may be given. Short cool sitz-baths, 50° to 65° F., one to five minutes, or the ice-bag to the lower vertebræ for one-half hour are effective. Carbonic acid gas baths are of value. (See pages 117, 135.) In appropriate instances stimulation of the uterus by the introduction of the sound may be carried out two or three times a week. Much is claimed for the regular use of electricity, the negative electrode being introduced into the uterus, a current of 10 to 20 milliamperes being used for five minutes twice a week. Apiol capsules (containing gr. iv) are given three times daily for amenorrhea, their administration being begun one week before each period. When the symptoms of menstruation appear, four capsules are to be given within a period of four hours.

Acquired amenorrhea, which is so often noted in many obese women from the twenty-fifth year on, is a condition extremely difficult to correct. Coincident with obesity there takes place a gradual atrophy of the uterus. Treatment directed to the reduction of the obesity rarely has any effect on the amenorrhea. In such cases ovarin tablets, 5 grains each, four times a day, should be administered for months, combined, unless contraindicated, with the use of iron and arsenic. The amenorrhea resulting from lactation atrophy demands general constitutional stimulative treatment, the use of Nauheim baths, hot vaginal douches, and in some cases energetic scarification of the cervix. Electricity, as noted above, should be used. In such cases, too, the combination of ovarin, iron, and arsenic is of greatest importance.

The amenorrhea resulting in the form of climacterium præcox, sometimes without constitutional symptoms and sometimes with

constitutional symptoms, likewise demands general constitutional treatment. The amenorrhea due to shock or associated with an altered mental state should be treated by constitutional methods, the treatment belonging to the realm of neurology.

Masturbation must be stopped. Atresia must be corrected by surgical measures.

The only dietetic method of reducing fat consists in the proportionate diminution of the sum of calories in the food. The best results are obtained by selecting from the various series of diet prescriptions the particular articles best suited to the individuality of the patient and the surroundings in which she is placed. In some cases the limitation of food supply would be followed by injury or collapse; favorable results can be expected only by a gradual habituation to a greater exchange of energy. In the thyreogenetic cases the indications are for the administration of thyroid-gland substance. (See Hypophysis Therapy.)

DYSMENORRHEA

In normal menstruation we are concerned primarily with the ripening of a Graafian follicle and with the congestion produced by the ovarian secretion. As a result of the action of the ovarian secretion there occurs a hyperemia in all the pelvic structures which is characterized by a dilatation and fullness of the vessels. This change is most marked in the uterus. The uterus becomes softer and larger, the uterus lining is thicker and markedly congested with blood, and blood extravasation takes place in the superficial layers of the mucous membrane. Blood is thrown out into the uterine cavity and uterine contractions force it out through the cervix. The tubes are also congested during the menstrual act, but bleeding from the mucous membrane of the tube very rarely takes place.

The pre-menstrual stage begins eight to ten days before the bleeding and gradually increases up to the time when blood is first poured out. A painless normal menstruation implies that there is normal ripening and bursting of a follicle; that there is congestion in a uterine wall which is not inflamed, infiltrated, or sclerotic; that the mucous membrane can readily become swollen and can take up the blood which is extravasated; that the capillaries and vessels are of normal caliber; that the uterine cavity is large enough to permit swelling of the mucous membrane; that the menstrual blood flows out readily through the cervix, and that the congestion in the various pelvic organs is not opposed or limited by inflammation or adhesions.

A normal menstruation should take place without pain. There is naturally a slight feeling of weight in the pelvis with some pressure and some sensation of weight in the region of the ovaries. Every pain occurring during or before menstruation is to be considered as dysmenorrhea.

Definition.—By dysmenorrhea is meant the process of menstruation accompanied by pain. It represents no disease, no pathologic entity, but is only a symptom which may be due to various

diseases or abnormalities in the genital tract. The diagnosis of the cause of dysmenorrhea is extremely difficult in many instances because we frequently have no alterations which can be recognized by palpation. Often the diagnosis depends upon non-palpable changes of an organic or nervous nature. In every instance anatomic or functional changes must be sought for which influence the course of the menstrual process.

Menstruation is not a process which takes place in the uterus and ovaries alone, for the pre-menstrual congestion affects all the organs in the pelvis, as well as the central and peripheral nervous system, and the various organs of the body dependent on them for their nerve-supply. Dysmenorrhea in its broadest meaning includes all the disturbances of a physical or mental nature; but when strictly considered, concerns only those symptoms which play their rôle in the small pelvis (Winter).

True dysmenorrhea is concerned with processes which take place in the uterus. Uterine dysmenorrhea is in all probability often due to small recognized or unrecognized myomata situated near the cervix or situated in the wall of the uterus or near the mucous membrane. It is frequently due to inflammatory processes involving the endometrium and the uterine wall and resulting in a large uterus. In a few instances it is due to an acute anteflexion, and possibly in some cases to marked retroflexion, either of which may produce a great degree of obstruction at the internal os. In the majority of cases, however, bimanual examination does not divulge the changes which are responsible for the painful menstruation. Most cases of uterine dysmenorrhea, then, do not show palpable lesions. They are due: (1) to hypoplasia of the uterus; (2) to mechanical or spastic obstruction in the region of the cervix; and (3) to inflammatory involvement of the endometrium or the uterine wall, without enlargement of the uterus.

The annoyance felt in uterine dysmenorrhea is, in some cases, *pain in the back*, in other cases pain in both sides, sometimes a feeling of pressure in the pelvis, in other cases there is extension of pain into the legs, in most cases there are colicky pains in the uterine region. The characteristic of these pains is that they are intermittent, for the essential element in the production of uterine dysmenorrhea is contraction of the uterus.

Hypoplasia.—Hypoplasia of the uterus is an extremely frequent cause of dysmenorrhea. During the pre-menstrual period, the ten days immediately preceding the appearance of blood, the superficial capillaries become greatly dilated. Serous infiltration of the endometrium separates the meshes of the stroma and is accompanied by a gradual but decided dilatation of all blood-vessels and lymph-channels. The glands become larger and wider, being often filled with secretion. The swelling of the mucous membrane, the dilatation of the blood-vessels, the production of round cells, and the growth of the superficial layer of the endometrium produce the so-called decidua menstrualis. The endometrium is at this period from 5 to 7 mm. in thickness. In hypoplasia the vessels of the uterus and its lining are filled with blood by the pre-menstrual congestion, but the vessels are small and do not take up the blood readily. The cavity of the uterus is too small to permit of a normal swelling of the mucous membrane. Increased tension in the small vessels causes tonic contraction or cramp in the uterus. The congestion, during the few days before the appearance of blood, comes to its climax with the greatest of difficulty.

Hypoplasia is frequently found, especially in young, chlorotic, anemic girls with delicate physique, or in obese girls. Dysmenorrhea is generally experienced from the first establishment of menstruation, but it does not always develop in this manner, sometimes first appearing after menstruation has continued for a year or two, when the menstrual congestion gradually becomes greater. There is generally a history of late menstruation. The pains begin several days before the bleeding, in other words, at the beginning of the pre-menstrual congestion, and not infrequently recur at various periods during the menstrual time. The slighter the bleeding, the greater the dysmenorrhea. It almost never occurs for the first time after marriage, but, on the contrary, frequently improves after marriage, and of course after labor. On examination, the diagnosis is aided by the finding of a small uterus, by recto-abdominal palpation, by vagino-abdominal examination, or by the use of the sound.

Mechanical Dysmenorrhea.—In mechanical dysmenorrhea we are concerned with obstruction to the outflow of menstrual blood. The period during which blood is thrown out is the men-

strual period. The superficial capillaries are greatly dilated, and an exit of blood-elements, not dependent on a bursting of the capillaries, goes on for several days. The bleeding occurs partly through diapedesis and, in strong bleedings, through rhexis. There is little or no destruction of the mucosa, only a very slight fatty degeneration of the epithelium of the uppermost layer, so that in the excreted blood relatively few epithelial cells are found. The first stimulus to bleeding is due to contraction of the uterus, which at the height of congestion is possibly accompanied by contractions of the tube. During menstruation the uterus is larger, and in the first few days following, likewise soft and flabby. The flabbiness lasts longer than the bleeding. A spontaneous dilation of the cervical canal takes place and reaches its height on the third or fourth day. This dilation takes place without regard to the amount of blood discharged, whether the menstruation be painful or painless. The blood thrown off is mixed with the mucus of the uterus and cervix, and later with the acid secretion of the vagina, for this reason coagulating less easily than other blood. Whenever the menstruated blood finds obstruction to its outflow through the cervix, excessive uterine contractions result. Excessive uterine contractions produce uterine colic when the outflow of blood is obstructed or rendered difficult. The position of the uterus in a few cases is responsible for this obstruction. Acute anteflexions are frequently considered the cause of dysmenorrhea, but this etiology is by no means so frequent as formerly believed. If the cervix and uterus lie parallel, then anteflexion is acute enough to constrict the internal os. The greater the bleeding, the greater the pain. Retroflexion, however, is only rarely the cause of such an obstruction. Obstruction is most frequently produced by stenosis of the cervix. Pain may result with total absence of stenosis, if a large amount of blood is poured out and if the blood clots and is forced out as clots. Such obstruction is rarely caused by the external os, however small. Therefore discission is of little value. Most frequently we are concerned with the internal os. In some cases the obstruction is a real stenosis which barely permits the introduction of the smallest probe. In other cases the sound enters readily, but obstruction is due to overgrowth of the endometrium at the cervico-uterine junction, which, when congested

before menstruation and during menstruation, prevents the ready outflow of blood. To such a condition the term **cervical adenoids** may be justly applied.

Stenosis of the cervix as a cause of dysmenorrhea should be diagnosed only if it can be demonstrated by a probe or if it follows the symptomatology to be mentioned, or if, after dilation of the cervical canal shortly before menstruation, dysmenorrhea ceases.

Mechanical dysmenorrhea usually depends on cervical changes, and for that reason occurs from the first onset of menstruation. It sometimes begins, however, after menstruation has taken place for a year or two and grows continually worse. Pain begins very shortly before the appearance of blood and is due to uterine contractions caused by the obstruction to the outflow of blood. The greater the bleeding, the greater the pain. In some cases only a narrow probe can be passed through the internal os. In other cases the sound passes, but an obstruction to the outflow of blood is furnished by overgrowth of mucosa at the cervico-uterine junction; in other words, by cervical adenoids. After a fair amount of blood has been passed the pain diminishes or ceases and seldom recurs during the subsequent days. When it does recur, it is usually followed and relieved by a new flow of blood, and may thus continue for three or four days. Dilation three or four days before menstruation relieves the pain with stenosis. Such dysmenorrheas are cured by labor. If the canal is of normal size and no mechanical obstruction is present, the cause of dysmenorrhea is to be sought next in inflammatory changes of the endometrium, generally of the nature called exudative and interstitial.

Dysmenorrhea of Inflammatory Endometritis.—If the uterus is normally developed and there is no mechanical obstruction, the cause of dysmenorrhea may frequently be referred to inflammatory changes in the endometrium. These changes are interstitial or exudative in their character. We have two forms: The one form, which is purely inflammatory and interstitial; and the other form, which is inflammatory and interstitial, but combined with it are glandular hypertrophic hyperplastic changes. In these interstitial forms we may have fluor as a symptom and cervical and other evidences of uterine inflammation or uterine catarrh. But ofttimes no fluor is present. The uterus is extremely sensitive

to the sound and the lining is not infrequently rough when examined by this method. This form of dysmenorrhea usually begins several days before the bleeding, with pre-menstrual symptoms. The bleeding itself is normal with the purely interstitial forms, but with the combined interstitial and glandular the amount of blood lost is increased. The important characteristic of this form of dysmenorrhea is that it is generally acquired. All dysmenorrheas which occur first after marriage or which grow worse after marriage are almost inevitably inflammatory in their nature. Here pre-menstrual and menstrual congestion in a uterus with an inflamed lining or wall causes uterine colic. Catarrh is often an important symptom. Inflammation may be present without either hemorrhage or fluor. It is evidenced also by "nervous symptoms of menstruation." The endometrium is then sensitive to the sound. This condition is generally acquired. In many cases there is evidence of metritis, salpingitis, and peritonitis. In those cases in which dysmenorrhea is present from the establishment of menstruation it is to be referred to an infection occurring in childhood or to the infectious diseases of childhood. In certain cases the inflammatory changes can be evidenced to the eye, if the lining of the uterus is thrown off in the condition known as dysmenorrhea membranacea.

Dysmenorrhea Membranacea.—A rare but typical form is dysmenorrhea membranacea. Menstruation is not a process by which the mucous lining of the uterus is thrown off, with subsequent regeneration previous to the next menstruation. It is simply the excretion of blood from the decidua menstrualis, occurring for the simple and sole reason that there is in the uterus or tube no fecundated ovum. In dysmenorrhea membranacea the whole uterine membrane, or more frequently pieces of endometrium, are thrown out at menstruation, accompanied by much pain. Examination by the microscope shows the typical picture of interstitial or interstitial plus exudative inflammation.

In dysmenorrhea membranacea the whole membrane may be thrown out and even the openings at the tubal corners may be seen. As a rule, the membrane is thrown out in pieces. The microscope gives a typical picture. There is always interstitial endometritis; there are scattered groups of round-celled infiltra-

tion. The spaces of the interglandular tissue are filled with a finely granular exudate and blood, forming the exudative type. Sometimes large cells are present and produce a resemblance to decidua.

Tubal Dysmenorrhea.—Since congestion occurs in all the pelvic organs at menstruation, pain may be felt in the ovaries, the tubes, the peritoneum, and the connective tissue, or may manifest itself as a general nervous alteration if inflammation be present in these pelvic structures.

Tubal dysmenorrhea is due to chronic inflammation of the Fallopian tubes and is often associated with adhesions. Here the dysmenorrhea simply represents an exacerbation of the pain felt at other times. No tubal dysmenorrhea should be diagnosed without the discovery by bimanual examinations of alterations of their form, size, or position. The annoyance is one of discomfort and rarely one of marked pain. Dysmenorrhea due to peritoneal or connective-tissue involvement implies an existing inflammation in the form of chronic peritonitis or chronic parametritis. These cases simply represent at the menstrual period an increase of the pain more or less constantly associated with the lesions themselves.

Pain due to tubal inflammation is of a gnawing, burning nature felt in the side. Actual colics usually come from uterine contraction, though they may be due to tubal contractions. In chronic inflammation the pre-menstrual congestion causes pelvic pain, and generally the uterus, tubes, and ovaries are affected.

Ovarian Dysmenorrhea.—Ovarian dysmenorrhea, as a rule, is due to chronic inflammation of the ovary, sometimes with severe degrees of adnexal disease, very often with mild, almost unrecognized forms of inflammation.

In the chronic form of interstitial oöphoritis there results the formation of connective tissue with sclerosis; the follicles are destroyed and the stroma shows fibrous connective tissue. It is not to be doubted that the infectious diseases of childhood may be responsible for such alterations in the structure of the ovaries. Other infectious diseases are likewise a cause of structual alteration. Intraperitoneal conditions are a frequent cause. The peritoneal irritation and peritoneal exudation associated with

milder or severer degrees of appendicitis or of tuberculosis results in infection of the follicles and in interstitial inflammation of the ovaries. Upward extension of inflammation from the uterus in the gonorrheal infection of children, and in the subacute upward extension of gonorrheal or other inflammations in adults, is the most frequent cause of ovarian involvement, with or without the production of adhesions. In such cases we often have single or multiple Graafian follicle cysts or small tubo-ovarian cysts.

Retention cysts originate, as a rule, in consequence of chronic inflammatory changes. Through the resulting hyperemia there occurs a serous exudation from the vessels and an effusion of serous fluid into the follicles. In advanced cases the greater portion of the interstitial tissue may be replaced by cysts. The cysts, as a rule, attain the size of a ripe Graafian follicle. The lining of the follicles plays only a passive rôle. Interstitial oöphoritis is the most frequent cause of follicle cysts. The ovary contains numerous follicles of various sizes. Retention cysts are inflammatory cysts in which there occurs a "cystic degeneration" of the ovary, often associated with visible disease of the tubes and with mild adhesions. This gross condition is generally double, but the pain is usually unilateral. The entire ovary is distended and its surface is irregular. If the condition continues, one follicle may overtop the others, may cause them to atrophy, and may result in the formation of a large Graafian follicle cyst.

For the expulsion of an ovum from the Graafian follicle, a gradual increase in size of the follicle takes place, depending partly on an increase in the amount of the liquor folliculi. The opening which serves as an outlet for the ovum is formed partly by the thinning of the tunica albuginea by pressure and partly by the chemical or enzyme effect produced by the ripe ovum. In the newly born and in children follicles of the same size exist without bursting, the so-called atresic follicles. The ova are small and unripe, hence the follicles do not burst. Unbroken atresic persisting follicles may occur at various ages in adults. In women in whom the follicles do not open but do degenerate as a result of missed ovulation, there is a lack of ovarian energy and varying degrees of amenorrhea often occur. At and after puberty we judge the vitality of the ovary by its ability to bring its ova to a stage called ripe.

Congestion and tension in the ovary accompany the congestion of the uterus and pelvic organs which results in menstrual bleeding. If an ovary functionates and if its ova are ripe ones, then any change in the structure of the ovary, in its tunica albuginea, or in its nerve-fibers will result in unusual manifestations when Graafian follicles increase in size for the expulsion of ova. This congestion and tension will be experienced as a severe pain in hypersensitive, long-suffering women. Increased tension in the ovaries causes swelling of the mucous membrane of the uterus and may prolong menstruation. Ovulation occurs from four to eight days before menstruation, but it may occur at other periods, as ripe follicles ready to burst may be present at any time.

From inflammatory causes, and also in young girls and women without evidences of inflammation, ovarian dysmenorrhea is very frequently due to a thick albuginea which makes the breaking of a Graafian follicle difficult. No evidences of adhesions are present about the ovaries. This pain does not necessarily occur at every menstruation. Ofttimes the sensitive ovary can be felt to be enlarged before the Graafian follicle which produces the pain bursts.

In ovarian dysmenorrhea there is shooting, boring, pressing pain in the region of the ovary, frequently extending out into the hips or thighs or up to the ribs. As with any inflammatory condition of the uterus and adnexa, this may represent simply exacerbation of the pain felt at other periods or on examination, or else the pain is felt only before and during menstruation. Nausea is often a marked symptom. The ovaries are sensitive and enlarged and most frequently not adherent. There are many cases where, without palpable inflammatory involvement, severe pain is felt in the region of one or both ovaries during menstruation, for the etology of which ovarian alteration we may look back to changes produced in their structure by the diseases of childhood perhaps. (See section on Pain.)

The diagnosis of ovarian dysmenorrhea implies the finding by bimanual examination of palpable changes in an ovary or the finding of a sensitive ovary by bimanual manipulation.

In chronic oöphoritis the ovary is rarely as large as a small egg. It is sensitive and other inflammatory evidences may be present.

In making the diagnosis of chronic oöphoritis, the ovary may be felt to be constantly enlarged and to be painful and sensitive on pressure. Care must be taken not to include in this class an ovary containing a Graafian follicle about to burst which gives on a single bimanual examination the evidences of an enlarged sensitive ovary. Repeated examinations must show such an ovary to be constantly enlarged. Small cystic degeneration is evidenced by a hard, tense feeling or an irregular surface. In the smaller cirrhotic conditions of the ovary the cystic consistence is generally lacking. Such an ovary is found only on careful bimanual examination. It may be situated in the normal location of the ovary, but very often it is posterior to the uterus or in the cul-de-sac of Douglas. These smaller ovaries are of various sizes and are with or without adhesions but may be, nevertheless, structually altered.

Ovarian Neuralgia.—Olshausen has described what is called ovarian neuralgia, in which there are no signs or evidences of inflammation or adhesions. Pain is felt during menstruation especially between the twentieth and the thirtieth years. It is considered a neuralgia because it begins suddenly, lasts a few hours or days, and stops suddenly. By others it is called perioöphoritis or hysteria. It generally implies a structural change in the ovary. (See section on Pain.)

Hyperesthesia of the Endometrium.—There is a form of dysmenorrhea in which the uterine lining is extremely sensitive to the sound. The internal os is likewise very sensitive. Objective evidences of inflammation are absent. This condition is considered as a simple "hyperesthesia of the endometrium." In many cases, however, there is probably an inflammatory interstitial or exudative condition in which other evidences of inflammation are not present, and for that reason the cause in virgins is to be referred back to the diseases of childhood.

These are cases in which, according to Winter, a careful local examination shows no structural changes whatsoever, either in the uterus or in its lining. In these instances the dysmenorrhea is referred to excessive irritability of the genitalia and undue sensitiveness of the entire nervous system, so that the pre-menstrual congestion acts upon the uterus and all the other organs with unusual irritation. In the absence of inflammatory symptoms

dilatation of the cervix is a very good means for excluding the obstructive form of dysmenorrhea.

Pre-menstrual symptoms result from the pre-menstrual congestion. There is a sensation of pressure or a feeling of swelling in the genito-urinary tract. The patients seem conscious of the presence of a sensitive uterus. There is a desire for frequent urination; there is a sensation of pressure in the rectum; there is pain in the back and in the legs. These symptoms are related to menstruation and its associated congestion. There are other symptoms of a general nature.

Ovarian secretion causes a general pre-menstrual congestion involving the circulatory system, the nerve-centers, and the mucous membranes. The action of the ovarian secretion upon pulse tension, and its effect upon the mucous membranes of the body generally, are evidenced by the congestion of the vocal cords during menstruation, so that during this time the singing voice is poor. The secretion of intestinal mucus is also greater, there is increased perspiration, the lower turbinated bones are swollen, and the eye suffers limitations in power.

Chvostek, in observing the relations between the liver and glands with an internal secretion, found that in all but 3 of 30 women examined the liver increased in size during the menstrual period, the lower margin of the liver showing an increase in size amounting to one or two fingerbreadths. In all probability the hyperemia in the liver is produced by the internal secretion of the ovaries at the menstrual period. The whole function of menstruation is accompanied also by changes in the activity of the stomach. The secretion and the motility of this organ undergo a great change during menstruation. The acidity of the gastric juice and the free hydrochloric acid are increased. At the same time the motor function is below normal throughout the entire period of menstruation.

The constitutional congestion of menstruation is apt to increase any annoyance existing in sensitive portions of the body. It increases the tendency to skin affections; it increases the tendency to excitability, mild hysterical attacks, etc. These results are due to the perfectly physiologic constitutional congestion which occurs with and is associated with menstruation, but which acts with undue force on sensitive nervous systems. The patients are

nervous or tired or excitable. They have a restlessness that is sometimes maniacal. There is palpitation of the heart; there is a change of temperament which is marked. They are mentally upset and sometimes melancholy. These symptoms are exaggerations of the complaints which even healthy women feel at this time. Such symptoms are not infrequently found with metritis and with inflammatory tubal and ovarian diseases. They are very frequent in women suffering from inflammatory endometritis, in whom, be it said, metritic, tubal, and ovarian changes often escape detection on bimanual examination.

Schauta gives us the annoying symptoms noted in other organs than the uterus during menstruation, and especially in dysmenorrhea; feeling of heat, cold feet, frequent urination, dyspepsia, headache, hysteria, etc. As symptoms of the latter, there is anesthesia of the bulbi, hyperesthesia of certain points in the abdomen, singultus, spasm of the glottis, epileptiform attacks. Recurrences of dysmenorrheic pain are ofttimes enough to shatter the nervous system and to provoke neuroses and psychoses. One of the most important sequelæ is headache, diffuse or of the form of hemicrania. Long-existing dysmenorrhea increases the tendency to the development of hysterical attacks.

TREATMENT OF DYSMENORRHEA

The treatment of dysmenorrhea demands improvement of the general health. Especially is this true of the numerous cases due to uterine *hypoplasia*. (See Hygiene of Puberty.)

In many of the latter it is not feasible to aid the development of the uterus by the use of the electric current or by the wearing of an intrauterine stem pessary. The negative intrauterine galvanic electrode is introduced into the uterus, or the faradic bipolar electrode is used in the uterus. Cases of hypoplasia should be treated by general tonics, by a generous diet, by plenty of outdoor exercise, and by hydrotherapy in the form of salt baths or Nauheim baths. The administration of iron and arsenic is advisable if there is any evidence of chlorosis. Drugs which have a more or less trophic action on the uterus, such as hydrastis and viburnum prunifolium, may be given for long periods; the fluidextract of

hydrastis, 15 minims four times a day, and the fluidextract of viburnum prunifolium, 30 minims three times a day. Apiol, 4 minims several times a day, in capsules, begun a week or ten days before each menstruation, or continued for weeks and months, is occasionally of aid. Ovarin (five grains three times a day) should be administered for several months. In some instances this administration of ovarin (gr. v in tablets t. i. d.) is of value, some of the subsequent menstrual periods taking place with much diminished pain, but rarely does this early improvement last for more than three or five months. The pain felt at menstruation then recurs with previous severity. Pain is diminished by rest in bed during menstruation. The bowels should be kept open and especially well before and during menstruation. The hot-water bag often gives great relief, and warm and even hot sitz-baths diminish the pelvic pain. A valuable combination consists of 10 minims of tincture of gelsemium, 10 minims of cannabis indica, in 1 dram of compound tincture of cardamon, given at least four times a day.

℞. Tinct. gelsemii..... ℥iij
Tinct. cannabis indic..... ℥iij
Tinct. cardamon co.....q. s. ad ℥iij
M. S.—℥j t. i. d. and at night.

Its administration should be begun several days before the outflow of blood and continued for several days. If this fails to stop the pain, the coal-tar products are of greatest value. Only the severest forms are to be relieved by hypodermic injections of antipyrin or of morphin. For quieting the associated nervous annoyances hyoscin hydrobromate, codein, and strontium bromid are of importance.

The dysmenorrhea due to hypoplasia of the uterus is a dysmenorrhea which often improves after marriage through the trophic effect of ovarian stimulation, and, of course, disappears after childbirth, if pregnancy takes place.

The treatment of dysmenorrhea depends upon the cause. It goes without saying that the form dependent on obstruction to the outflow of blood in normally developed uteri, whether due, as it is in some cases, to a marked anteflexion of the uterus, or whether due, as it is in most of such cases, to overgrowth of endo-

metrium in the neighborhood of the internal os, or to a narrow cervical canal, can be corrected only by removing the obstruction which is overcome naturally after childbirth. The diagnosis can be made by gently and carefully dilating the cervix a few days before menstruation. This can be done by the introduction of Weir's sounds of various sizes under strict aseptic precautions, or by introducing into the cervix cotton rolled on an applicator and dipped into lysol solution or sterilized vaselin. Each successive applicator is made larger, to that in the space of ten minutes the cervical canal can be dilated to a fair extent. A thin strip of iodoform gauze rolled into wick form is then introduced into the cervix and allowed to remain for twenty-four hours, being removed by the physician at the next treatment. This procedure, carried out on two to four successive days before menstruation, relieves temporarily this form of dysmenorrhea and makes the diagnosis, if the cause is as above stated. Electricity is oftentimes of marked benefit (p. 121).

Such cases may be treated by the introduction of the stem pessary, to be worn more or less continually (Fig. 89). By some the wearing of the pessary during menstruation is advised; by others it is removed at this period. Although very good results have been reported, there is certainly this objection to the wearing of the stem pessary, that its presence constitutes an irritation which is likely to produce a more or less continued inflammation in the case of women subjected to the more or less continued introduction of bacteria through coitus. In cases of cervical catarrh and cervico-uterine infection the wearing of such a pessary is contraindicated.

The operation of curetting and discission offers relief in some cases, not so much through the discission, which does not correct the obstruction existing at the internal os, but more so through the curetting, if this is carried out thoroughly. If the curetting is done so that the adenoid hypertrophy at the internal os is removed, relief is experienced, but very often only temporarily.

A permanent cure of such cases can be absolutely accomplished by a high amputation of the cervix, the cervix being amputated at the level of the internal os. If, after operation, the internal os is kept open and dilated by iodoform gauze, or by a stem pessary introduced into the uterus until healing takes place without con-

traction, the cure of the dysmenorrhea is absolute. This operation is contraindicated in hypoplasia.

During dysmenorrhea relief may be obtained by rest in bed, by the application of hot-water bags, by warm saline enemata, and by the use of very hot vaginal douches.

In those cases in which little blood is lost a course of carbonic acid gas baths is of value. If there is chronic congestion of the pelvis, prolonged cool sitz-baths, 50° to 65°, five to thirty minutes, are of importance during the intermenstrual period, and Glauber's salts should be taken. In nervous and hysterical women, with hyperesthesia of the endometrium, spastic contraction of the internal os takes place, and may result in the formation of small coagula in the uterine cavity. The uterus contracts to expel these clots, which process causes great pain. For treatment of the pain we make use of hot abdominal applications, warm or hot sitz-baths, full baths of a temperature up to 100°, and warm vaginal douches.

℞. Fl. ext. vib. opulus..... ℥j
Elixir simplex..... ℥iij
S.— ℥ij in hot water every hour for six doses.

℞. Strontii bromidi..... ℥iv
Elixir pepsin..... ℥iij
S.— ℥j in water every three hours.

In most cases of dysmenorrhea the coal-tar products must be given for the relief of pain, the best of these being triphenin, 7 grains four times a day, or else antipyrin, combined with caffein, 5 grains three to four times a day. The former is not a cardiac depressant. Codein phosphate, $\frac{1}{8}$ to $\frac{1}{4}$ grain, added to the triphenin increases its value. Pyramidon, 5 grains, and aspirin, 5 grains, in combination, four or five times a day, with or without codein, are helpful. Apiol, 5 to 10 grains, in capsules, has worked well in the hands of many, often combined with ergot. Dionin ($\frac{1}{3}$ to $\frac{1}{2}$ grain) in tablets or in solution, several times daily, is an antispasmodic and analgesic worthy of trial.

℞. Triphenin..... gr. v
Ft. tal. caps. no. xx.
S.—One every two hours for five doses.

℞. Aspirin..... gr. iij
Pyramidon..... gr. iij
Ft. tal. caps. no. xx.
S.—One every three hours.

℞. Triphenin..... gr. iiss
Antipyrin..... gr. iss
Codein phosph..... gr. ½
Ft. tal. caps. no. xx.
S.—One every hour for three doses. Then every three hours.

In extremely severe cases of dysmenorrhea, especially of ovarian dysmenorrhea, antipyrin in hypodermic solution (5 grains) is often of remarkable efficiency, and takes the place of morphin, the use of which sometimes cannot otherwise be avoided. A drug which is of some relief in all forms of dysmenorrhea, especially in the form existing without any diagnosed alteration except uterine hypersensitiveness to the sound, or associated with general nervous phenomena, is bromid in the form of bromid of strontium, 10 grains to the dram of water every three hours. In some cases chloral hydrate, 3 grains, and the fluidextract of viburnum opulus, 15 minims in a dram of simple elixir, taken every hour in hot water for several hours, relieves the pain.

℞. Strontii bromidi..... ℥iv
Elixir pepsini..... ℥iij
Dram 1 in water every three hours.

℞. Fl. ext. choral hydrate..... ℥iss
Ext. vib. opulus..... ℥j
Elixir simplex ad..... ℥iv
S.—One teaspoonful in hot water every hour for 6 doses.

In those cases in which the dysmenorrhea is associated with the expulsion of much blood in the form of smaller or larger clots, stypticin, 2 grains, several times a day, should be given. When associated with an enlarged uterus of the form of fibrosis, ergotin (Bonjean), 2 grains four or five times a day, should be added. Curetting, however, is often an essential procedure for such cases.

℞. Triphenin..... gr. iij
Stypticin..... gr. iss
Ft. tal. caps. no. xx.
S.—One every two hours.

℞. Triphenin..... gr. iij
Stypticin..... gr. iss
Ergotin..... gr. iss
Ft. tal. caps. no. xx.
S.—One every two hours.

In the intrauterine treatment of many cases excellent results are obtained by the use of electricity, the negative pole being applied in the uterus (see Electricity). This good result is not very promis-

ing in the dysmenorrhea due to hypoplasia. In some cases, naturally only those of the most severe and absolutely unbearable type, when all other means have been exhausted, the removal of the ovaries furnishes the only possible relief.

In the treatment of acquired uterine dysmenorrhea we are concerned with the care of alterations resulting, in almost all cases, form inflammation; we are concerned, therefore, with the intermenstrual treatment of the cause, wherever localized, and with the treatment of the pain occurring at menstruation. The treatment of the pain demands those drugs, such as the coal-tar products, codein, pyramidon, and dionin, which diminish pain. The intermenstrual treatment demands attention to the cervical catarrh, to the involvement of the endometrium sometimes associated with hyperplasia, to the inflammatory metritis, and to the tubal, ovarian, and peritoneal complications (intravaginal pressure therapy, douches, sitz-baths, Nauheim baths, etc.).

The treatment of the pain occurring before and during menstruation in ovarian dysmenorrhea is by the coal-tar products, bromids, and codein. This pain, so often accompanied by nausea, is often not relieved by such medication. In fact, this failure is important in aiding the diagnosis of structural ovarian involvement. Ovarian dysmenorrhea is so very often considered a manifestation of neurasthenia and hysteria that a great injustice is done to many such long-suffering patients. Even if macroscopic and microscopic changes are slight, that does not alter the fact that it is the ovulation and menstrual congestion in the ovary which produce the steady, constant pain. If the pain is great enough and of sufficient duration to undermine the patient's nervous system, and if general and local treatment fails to improve the local annoyance, removal of the involved ovary is essential to prevent many such cases from becoming nervous wrecks. In most of these cases a varicose condition of the broad ligament is present. The ovary, tube, and upper half of the broad ligament and the ligamentum infundibulopelvicum must be removed. If the right ovary is the one involved, the appendix should certainly be removed. In those cases in which large amounts of blood are lost, and in which pain is increased by the expulsion of clots, treatment directed to the diminution of the amount of blood lost is an essential factor.

The treatment of dysmenorrhœa membranacea is thorough curettage.

EFFECT OF ATROPIN

Schindler studied experimentally the behavior of the rabbit uterus in the living animal under various stimuli. He showed that the uterus possesses the property of automatic, intermittent, and regular contraction independent of the central nervous system. The adnexa and the ligaments possess likewise an automatic rhythmic peristalsis. Mechanical, chemical, and thermal stimuli increase the intensity of the automatic movements. The response is more intense with heat stimuli than with mechanical or chemical. Violent movements are set up by the injection into the cornua of the uterus of a solution of silver nitrate or other silver salt. It appears to him that vaginal douches, rectal enemata, cauterization, etc., may increase the automatic peristalsis or antiperistalsis of the uterus. Schindler states that peristalsis alone is able to cause regurgitation of pus. The practical conclusion of his study is the necessity for keeping the uterus quiet in all inflammations. Atropin he believes to be a drug which arrests the automatic movement of the sexual apparatus and thus tends to limit the spread of infection. Its use would, therefore, be indicated in certain cases of dysmenorrhea.

CONSTITUTIONAL DYSMENORRHEA

The idea that the ovaries, by reflex nerve stimulus, are responsible for menstruation is old and no longer held. Menstruation results because no fecundated ovum takes its place within the uterus after the ovarian secretion has caused a thickening of the mucosa in preparation for the nidation of the ovum. As a result of menstruation the mucous membrane goes back to its former size and state, and a few days before the next awaited period undergoes, as a result of ovarian secretion, the same changes in preparation for nidation.

These local phenomena, resulting through the selective action of the ovarian secretion, are associated with phenomena in other parts of the body, resulting from or roused by the same or other hormones secreted by the ovaries. These phenomena produced

by the ovarian secretion partake of the nature of congestion and hyperemia, with increase of vascular tension, affecting particularly mucous and serous membranes and the glands and glandular structures of the body.

There is an increase in the blood-pressure seven to ten days before menstruation. Patients often complain of headache, colicky pains in the abdomen, drawing pains in the back and pelvis down into the thighs. In a nervous patient uterine contractions may increase up to the degree of spasticity, resulting in dysmenorrhea, perhaps associated with an existing hypersensibility. Menstruation may affect the eye and lids in many ways; may affect the ear, the digestive tract, larynx. There may be periodic toothache, labial herpes, stomach pain, loss of appetite. The premenstrual period has a bad effect on ulcer of the stomach. The skin changes are frequent, such as chloasma, erythema, eczema, urticaria, nervous skin swellings, etc.

Involved in this constitutional reaction, ofttimes visibly involved, is the thyroid gland. It is a matter of common observation that the neck enlarges and the thyroid swells during menstruation and during the early months of pregnancy. In pregnancy we have, as causative factors, the corpus luteum and the trophoblast; in the premenstrual period we have only the ovarian secretion, that produced by the follicles and the interstitial gland. This idea of interrelation and antagonism between ovary and thyroid appears to be generally accepted; they stimulate each other, and, at the same time, are probably antagonistic.

The reaction of the individual to the premenstrual cumulative influence of the ovarian secretion follows different types—some patients do not know from any symptom at all that menstruation is approaching; others show the local pelvic phenomena of congestion, discomfort, or pain; others have a constitutional alteration, characterized by a dull, heavy, tired feeling; a goodly proportion show symptoms of irritation, and constitute the excitable type. The reasons for these different types are to be found, naturally of course, in the character of the ovarian secretion, in its relation to other secretions, and in the sensitiveness of the organism that is being played upon, so to speak. In

some patients there is very little constitutional congestion produced by ovarian secretion, and very little alteration in any of the mucous or serous membranes; other individuals are possessed of a placid, nervous system, in many ways almost insensitive to such changes. In certain women the thyroid is scarcely stimulated by the ovarian secretion, or reacts too slightly, if at all, to its cumulative influence; in others, the faintest beginning of ovarian premenstrual activity is immediately followed by a response of the thyroid, in the form of actual or relative overactivity.

The reaction of an individual to the premenstrual phase is a fairly good indication of the sensitiveness of that patient's nervous organization at that particular age, or of the stability of that patient's nervous system. Whether this is due to either of the two gradations, too much ovary or too much or too little thyroid, it is an index of considerable importance.

Some severe cases of premenstrual constitutional annoyances are found in what might be called "nervous," "neurotic," or "neurasthenic" individuals, and this "nervousness" is in many cases nothing but hyperthyroidism, evident, too, in the intermenstrual periods. We are concerned also with that type which is relatively free, in the intermenstrual periods, from "nervous" symptoms.

Preceding the menopause age and stage, instances of constitutional dysmenorrhea become rather frequent. We have the type of case in which the annoyances were present to a greater or lesser extent for years from puberty on, or else developed at a later period, or came on after marriage, or were aggravated by various circumstances. Then comes another and important type, the cases into whose histories these annoyances come as a new process. These patients in their earlier years had slight, if any, premenstrual annoyances. As they approach the period of life when they look forward to the menopause their menstruation continues, even grows stronger, with or without intervals of amenorrhea, and marked cyclic states of irritability appear. These cases are, in a large number of instances, hyperthyroidism; some of them are cases of actual or relative hypothyroidism, for we find instances of the very opposite type,

too, where a phlegmatic and depressed state results, a condition often due to hypothyroidism. The cause of this dysthyroidism lies in the thyroid and ovaries. Either the latter functionate with marked energy, or overshadow the thyroid activity, or they actually overstimulate and rouse the thyroid gland, or else they work with less than their former power, but the thyroid fails to regress with equal degree, and a state of cyclic hyperthyroidism results.

The administration of thyroid gland extract between menstrual periods and before menstrual periods, serves to aid in making the diagnosis. In the hyperthyroid cases the premenstrual annoyances are brought out in the intervals, or are brought on earlier, or are accentuated by the administration of thyroid extract. Among the medical methods preparations of bromids, and of valerian and not infrequently ovarin, help to diminish the annoyances. In the hypothyroid or hyperovarian type small doses of thyroid are of specific value. In some of the hyperthyroid cases small doses of opium and belladonna are absolutely necessary to give the patient relief, not so much from their pain and discomfort as from the irritability and ofttimes almost maniacal restlessness which typifies these hyperthyroid cases. In the hypothyroid form, or hyperovarian type, thyroid should be given.

The fact that patients who have never had these annoyances in their earlier years, and that patients who evidence at times the symptoms of myxedema, acquire at later periods, and most particularly in the preclimacteric stage, these constitutional nervous phenomena, show that at that period there is decided susceptibility to alterations in the balance between thyroid and ovaries. This lack of balance between thyroid and ovarian secretion, and probably in very many instances a malrelation between other glands, especially the hypophysis, is of great importance. Too much ovarian secretion can cause congestive symptoms associated with irritability. It is common knowledge that the change of life, as the laity call it, is a critical period. It is not sufficiently recognized that the premenstrual period is often quite as critical. Are these cyclic annoyances to be explained simply on the theory of congestion and increased

tension produced by the ovarian secretion, or do other elements, influenced by the ovarian hormones, play an important part?

The change in gland relations which occurs at puberty, at which time minor thyroid annoyances are frequent, the thyroid phenomena at menstruation, during pregnancy, in association with ovarian affections, and during the climacterium, find a parallel in the fact that the more typical diseases of the thyroid, myxedema and Basedow's diseases, are eight to ten times as frequent in women as in men. No satisfactory explanation for this has yet been given. It always seemed to me plausible that the instability of the relation which the thyroid bears to the ovaries and uterus makes the thyroid surely more susceptible to the causes, whatever these may be, which produce these same diseases in a far smaller proportion in men.

The monthly play produced on a woman's nervous system by the premenstrual ovarian stimulation causes, either of itself or, in many cases through an exaggerated response on the part of the thyroid at these times, a group of nerve phenomena like those in hyperthyroidism, to which may be given the term constitutional dysmenorrhea.

Some patients are depressed almost to the verge of melancholy before each menstruation. They are sluggish in thought, indifferent to their surroundings. There is a mental inertia, they are inclined to be sleepy and drowsy, and awake without a sense of well-being. Pulse is slow, there is a sensation of cold. They constitute the phlegmatic type, and are the opposite of the type to which I desire particularly to draw attention as the more frequent.

There is in this other and important class of patients a nervous excitability in the premenstrual phase, an irritability, and a restlessness that is almost maniacal. The patients cannot keep quiet, find it impossible to lie down or rest, are unable to keep their minds on any one subject. They have not the patience to take part in conversation, or to listen to any talk or information. They realize that their train of thought is unusual. They have a sense of heat, and complain of burning sensations. There is a tremor about the hands, and the knee-jerks are exaggerated. They sleep badly, and have a pulse of 90 or more.

There is another class of patients, in whom there is a play between hypothyroidism and hyperthyroidism. The symptoms of hypothyroidism may seem to be manifest between menstruation, only to be changed to the type of hyperthyroidism before and during menstruation. We must dissociate that type suffering from well-marked annoyances of probable hyperthyroidism at all times from the type where the hyperthyroidism is characterized by its premenstrual periodicity.

It is possible that the thyroid undersecretes in many cases at first, producing, perhaps, physical weakness, tendency to fatigue, diminished sweating, loss of hair, dysmenorrhea, etc. It is possible that such evidences of diminished thyroid function, associated in some cases with muscular and joint pains, may precede or end in or complicate a change from hypofunction to hyperfunction; in other words, a lesion produced in the thyroid, and resulting in lowered energy of the gland in part, leads to an attempt at compensation, and results in symptoms quite different from the early ones of depression. This view of hypothyroidism, associated with the early stages of hyperthyroidism, may account for the improvement obtained by thyroid treatment or by the use of iodin in cases of apparent hyperthyroidism. (Dock).

Mild forms of hyperthyroidism, which resemble neurasthenia, are very frequent. On the other hand, in many neurasthenics there is overactivity of the thyroid. Just as the larger number of cases of hyperthyroidism are transient, and recover rapidly with appropriate medication, so many of these cases of so-called constitutional dysmenorrhea are cyclic hyperthyroidism and may be benefited or cured.

It must be remembered that various emotions and mental stimulation rouse the thyroid to activity. The same is true in the sexual sphere, and holds good for some of the diseases of the genitalia. Alcohol, coffee, tea, iodids, and arsenic stimulate the thyroid. The thyroid is quieted by rest, freedom from sexual stimulation, and by the correction of pelvic congestion and pelvic pains. A milk diet, the glycerophosphates, ergot, and especially the bromids, opium, and belladonna, are of great service. In certain cases ovarin works very well.

The uterine lining is acted on by the ovaries, probably by the

follicle secretions. Some of the cyclic phenomena, occurring in the uterus as part of the normal process called menstruation, are due to the interstitial gland. The uterine lining reacts on the ovaries, too, for, if the uterus is removed, ovarian secretion gradually diminishes and ofttimes ceases long before the end of two years. The lining of the cervix and uterus and their hormones react on the ovaries. When a fecundated ovum is present, it stimulates the ovary to the production of a corpus luteum, and the corpus luteum still further stimulates the decidua and uterine growth. We are certain that the relation of the thyroid to the ovary sensitizes the thyroid gland, and that the relation between the uterine lining and the ovary sensitizes the ovary.

If we remove the endometrium, we take away one of the elements which react on the ovary. If we can make these patients cease menstruating and leave the ovaries behind, the oversecretion of the ovaries and the cyclic response of the thyroid seem to be markedly weakened and usually removed, and the reaction of the ovaries to the endometrical hormones is done away with. I know only one way of preserving the ovaries, for a time at least, and putting a stop to menstruation, and that is to remove the uterus. My list of operative cases of this type at present is not large enough to go into an extensive discussion of the subject. I am, with each year, more and more convinced that hysterectomy, especially vaginal hysterectomy, whenever possible, offers, in a large number of such cases, relief from annoyances which not infrequently persist for years, and which may bring patients, to say the least, to the verge of invalidism. I can see no theoretic objection to the procedure. It spares the patient the oft-associated loss of large amounts of blood which, in itself, is a factor worthy of consideration.

In hundreds of cases of real hyperthyroidism the thyroid is removed in part, or its blood-supply is diminished by operative procedure, when the indication is by no means one of life and death but only one of comfort. Why should not the same view of eventual surgical relief hold good in the type of constitutional dysmenorrhea which I have mentioned?

This type of cases referred to here cannot be properly studied or appreciated in dispensary practice. They seem to affect

patients in the higher spheres of life, and require long-continued observation to thoroughly understand the type of annoyances, to make the diagnosis by observation and by the use of thyroid or ovarin, to see the effects and improvements obtained by local treatment and the elimination of irritations.

It has been said that no uterine hormone has ever been demonstrated. It is impossible to confine ourselves, in a theoretic argument, or attempt to come to a logical conclusion to facts absolutely demonstrated in the laboratory or by animal experimentation. Besides, there are hormones which produce an immediate result, such as adrenalin, or which give a quick response within a few days, such as thyroid. The ovarian hormones and the uterine hormones do not act so promptly, even when both ovaries are working in the human economy; it takes them twenty-eight days to produce their cyclic uterine alterations, and if the hormones of the uterus do respond and react on the ovary it is probably only an activation of the ovarian secretory function, all of which are points which animal experimentation or human observation can clear up with difficulty in such a direct and rapid manner as to prove that these hormones do exist. Besides, the ovary possibly possesses other hormones than the products of the follicles or luteum secretion (interstitial gland).

A point of great importance is the answer to the question, Why does ovarian secretory activity diminish after removal of the uterus? Now, it is a fact that scarcely a single secretory gland can be removed experimentally, in whole or in part, without involving the other glands of the body in the way of hypertrophy or atrophy. This interrelation between the glands is very complicated. If removal of the uterus, and with it its lining, does produce such a result in the ovaries, then, whether uterine hormones have been demonstrated or not, it must be apparent that a failure of the uterine elements to react on the ovaries deprives the ovaries of a certain stimulus which keeps up or activates their function.

If a too thorough curettage be done, or if any intra-uterine manipulation be carried out which ends in a cessation of menstruation, and gradual, temporary, or permanent amenorrhea,

why haven't we the right to say that something has been removed from the uterus which has a stimulating action on the ovary, the ovary underfunctionates, fails to restimulate the uterus sufficiently, and by this diminution of interaction ovarian and uterine atrophy results? The same idea holds good, in all probability, in lactation atrophy.

It has been said that the thyroid is arbitrarily selected as the cause of these annoyances, and that the hypophysis plays a more important part. No one can deny the importance of the hypophysis. In childhood it is an important factor in promoting growth, and lack of it inhibits development, both of the body and the genitalia. In adult life too much hypophysis causes acromegaly; too little hypophysis causes dystrophia. The hypophysis is intimately connected with the development of the sexual apparatus. Its influence is altered during pregnancy, but all these changes are of a slower type; they probably take weeks or months to produce their annoyances, and they are not at all cyclic, so far as we know at the present time. But the ovary and its relation to the thyroid represent an apparatus in a continual state of changeable relation, and that changeable relation is cyclic, and is one of the responsible factors in making women the weaker sex. Why is it universally recognized that the thyroid has a most intimate relation to the genitalia; it is practically a sexual gland. There are well-defined symptoms of hyperthyroidism and hypothyroidism. In oversecretion of the thyroid we have the greatest variations from typical cases of exophthalmic goiter to cases without the exophthalmos, without the marked goiter, without the tremendous tachycardia, down to the forms characterized by nervous irritability, by digestive annoyance and only moderate amounts of tachycardia. Some of these eventually develop symptoms which makes the diagnosis absolutely certain, others improve so rapidly that our first diagnosis seems afterward to have been only a suspicion. Many of the cases are masked, and may be developed by irritation or by the administration of drugs given for therapeutic or diagnostic purposes. One must not be influenced by just a few symptoms which are present, nor should the diagnosis be excluded because a certain number of symptoms are absent. When viewed from

the psychic sphere alone, the mental phenomena of undersecretion of the thyroid and oversecretion of the thyroid resemble each other, yet attention to other points of diagnosis usually aids in making the differential distinction eventually, and then, after all, the administration of thyroid eventually gives us the clue we want. In the same way we must depend upon long observation, upon the study of minute points, on an observation of the individual in the interval between menstruation, on the effect of drugs, and local therapeutic measures in making a diagnosis of these premenstrual cases. Many of them are simply due to overstimulation by the ovarian secretion itself, and it has been my desire to attract attention to the necessity of distinguishing between such cases, and cases where the annoyances are due to the thyroid gland which, hypersecreting or not at other times, is aroused to overactivity by ovarian stimulation. And right here, too, we must not overlook the type where an actual, or relative, hypothyroidism is concerned in the premenstrual and menstrual phase. Then, again, comes the class of cases where the relation between ovary and thyroid is so unstable that at times we have too much thyroid and other times too little; then, finally, comes the class where we may be dealing with an altered character of the secretion. In gynecology we have been suffering for years with the idea that the sexual organs, through reflex channels, have dominated a woman's physical and nervous makeup. Lacerations of the cervix have been operated on, retroflexions of the uterus have been corrected, prolapse of the ovary has attracted great attention, and various anomalies of the uterine lining have been considered, all of them, by reflex channels, to produce headaches, palpitation of the heart, nervousness, irritability, indigestion, and mental diseases. I have no objection to surgeons doing all the work they wish on the internal and external genitalia for mechanical and other reasons, but, as common-sense physicians, we must get out of the idea that by reflexes these lesions play their rôle. It is only when we understand the makeup of woman, the relation between ovary and thyroid, the effect of rest, the valuable influence of the correction of congestion; it is only when the mental and psychic stumuli and irritations and the effect of sexual stimulation and

deprivation are considered, that we can intelligently understand the nervous affections of womankind and treat them intelligently.

During all the years that the uterus is present, acted on by the ovaries, reacting on the ovaries, related directly or indirectly to the thyroid, it is an organ of importance only from the standpoint of propagation, and all the nervous annoyances from which women suffer because of the fact that they have ovaries and a uterus are the price which they pay for possessing an organ necessary to motherhood. After motherhood is no longer to be considered, or after a stage when motherhood should no longer be considered, the uterus is absolutely of no value. So long as it is productive of no annoyances, all is well. When that uterus is the seat of benign or malignant growths, operation is generally recognized as the only treatment in the malignant cases, and as the advisable one in a large number of the benign type. Then comes the cases where the uterus, because of excessive bleedings, or because it is totally prolapsed, produces annoyances which interfere with the patient's comfort and health, and in innumerable cases the uterus is removed. Now, if the uterus because it is present makes menstruation possible, whether it simply takes part in this process, or, by some relation to the ovary and thyroid, stimulates this process, it is nevertheless certain that premenstrual and menstrual annoyances of the type which I have described are markedly diminished, if not entirely removed, when menstruation no longer recurs. Any procedure, whether it is thorough curettage or atmokausis, or the use of drugs or the *x*-ray, which will stop menstruation, without a too sudden cessation of ovarian function, benefits these patients. If none of these methods are of avail, and the patient's steady or recurrent annoyances are sufficient to make her life miserable, and if we feel, as I do, that removing the uterus and preserving the ovaries will improve and cure this patient, then removal of the uterus, especially through the vagina, is a most legitimate operation.

Thyroid affections, occurring so much more frequently in women than in men, when of the type of Basedow's disease or myxedema of typical character, teach us that the minor grada-

tions of these diseases are also so much more frequent in women than in men. Hence, nervousness of a type in which the thyroid is the important factor, or only a contributing factor, are responsible for the fact that nervous conditions are so much more frequent in women than in men. Small wonder, then, that a goodly portion of women suffer from annoyances in which the thyroid plays a part, preceding or during menstruation, a time at which the vast majority of women realize that they are put to a severe mental and nervous strain. I have attempted an explanation, theoretic to be sure, of the frequency of thyroid affections in women. I fail to see how logic can lead us to any other conclusion than that the susceptibility of the thyroid to disease is in a great measure due to the fact that its relation to other glands is an unstable one, and that it is hypersensitive to annoyances and irritations of whatever nature. Now, just as eclampsia, even if we haven't found the actual chemical element or elements which produce the disease, is certainly due to the action of cells of the ovum, acting directly or through the medium of other glands, upon the blood and tissues of the body, so the ovary in some way, directly or through other glands, acts on the thyroid, and renders it liable to overactivity, underactivity, or malsecretion. When one considers the phenomena which lead to menstruation, it is impossible to avoid the conclusion that the uterus, by its very presence, and in all probability by elements secreted by its glandular structures, bears an important relation to the ovary, so that in the last analysis the thyroid acts on the uterus directly or through the medium of the ovaries, the uterus acts on the thyroid directly or through the medium of the ovaries or other glands.

Conditions due to hypothyroidism are not so difficult to combat. It is the hyperthyroid cases which cause the trouble.

Any treatment which relieves the patient of pelvic pain between menstrual periods, or relieves dysmenorrhea of uterine origin, corrects congestion and irritative anomalies of which the patient is conscious, or which interfere with ovarian function, is of the greatest value.

Local treatment and general medication can help many of these patients, even though the annoyances may recur at sub-

sequent periods. I have watched some of these patients for nearly ten years, and many of them have responded repeatedly to periods of treatment.

Viewed from the standpoint of the medical man, it might be said that these are nervous patients made worse at the menstrual periods. The neurologist might think of them as neurasthenics, irritated by the premenstrual phase. Others might consider them as masked Basedow cases, subject to various degrees of exacerbation at regular intervals. The gynecologist was formerly inclined to attribute annoyances to reflexes sent out from displaced pelvic organs or from altered structural conditions.

As a matter of fact, it really means that the premenstrual phase furnishes us with an index of the patient's nervous sensitiveness, or shows us how stable is the function of the thyroid, or how sensitive it is to variations in the function of the ovaries and the uterus.

That the ovarian secretion of itself, by its overactivity or underactivity or absence, may cause changes without placing the burden on over- or underactivity of the thyroid goes of course without saying.

It is the cases suffering from menorrhagia, plus these cyclic nerve upsets, that furnish the most marked indication for operative interference.

The annoyances which occur in the climacterium are of various forms. The nerve phenomena show variations from the phlegmatic type to the excitable type. The psychic variations run from melancholic and psychasthenic to manic forms. In many cases the annoyances are clearly the result of changes incident to the climacterium. In others they resemble various forms of mental diseases, and seem ofttimes to have nothing to do with the interglandular upset. Care is of course necessary to separate the forms which are coincident with the preclimacteric or climacteric phase from the forms which are due to the alterations of that period. Some women go through this time of life with scarcely a ripple to mar their good health, while others are miserable and unhappy for months or years.

There are women who are in this so-called change-of-life state (if that be used to signify an abnormal relation to and between

the secretions) during the greater part of their life, or for certain months of their existence, or preceding a few or many or all of their menstrual periods, and who suffer from the same variations, in the way of annoyances, as the class just mentioned, who are about to go or are going into the climacterium. There is too much ovarian stimulation or too little ovarian secretion; there is too much thyroid actually or relatively or there is too little thyroid, or there is a play between these various alterations.

UTERINE BLEEDINGS

Causes.—Carcinoma or sarcoma of the vagina is productive of bleedings on vaginal manipulation. Carcinoma of the vagina generally takes the form of flat infiltrations which affect part or all of the vaginal wall. Occasionally vaginal carcinoma takes the form of large tumors of broad extent filling the lumen of the vagina, or of papillary bleeding projections lying on the surface and affecting the whole vagina without deep infiltration. The infiltrating form may extend under the mucosa and gradually involve the whole length of the canal, making it scarcely passable for one finger. Sarcoma of the vagina causes flat ulcerating infiltrations or rounded tumors covered by mucosa. Sometimes there are grape-like bodies, also found in children. Otherwise it is not to be diagnosed clinically from carcinoma. When ulcerative changes result in arrosion of capillaries and vessels, the bleeding is profuse.

Erosions of the cervix are productive of but the slightest bleedings. Marked hemorrhage from the cervix may come from carcinoma, sarcoma, or myoma of the cervix, and especially from small cervical polyps.

Bleeding from the uterus may depend on general or local states. There are general *blood-states* in which blood coagulation takes place slowly, which may lead to loss of much blood from the uterus (scurvy, leukemia, anemia, hemophilia).

Perhaps some instances of bleeding are due to increased vascular tension. Passive congestion from a disease of the heart, lungs, and liver, etc., is supposedly a cause of profuse uterine bleeding. It may be stated, however, that diseases of the heart are more frequently followed by a diminished flow of blood.

Congestion in the uterine tract resulting in bleeding may be produced by retroflexions of the uterus. Retroflexions are a possible cause, if they occur after abortion or after labor and prevent the involution of the uterus. Koblanck observed that menorrhagia was

often due to masturbation and to disturbances of a sexual character. Sixteen women with menorrhagia and metrorrhagia acknowledged abnormal sexual practices, especially coitus interruptus, due to a desire to avoid conception. The symptoms improved with the regulation of the sexual relation. Inflammatory involvement of the peritoneum causes congestion in the uterus.

In addition to such causes hemorrhage from the uterus is due to some involvement of the uterine lining, with or without an enlargement of the uterus, to some structural involvement of the wall, with or without enlargement of the uterus, or to new-growths in the uterus or its cavity, which are, as a rule, associated with enlargement of the uterus.

The Ovaries and Bleeding.—The ovaries certainly bear some relation to excessive uterine bleeding; they are, after all, the cause of menstruation, and the vast majority of cases of relative or absolute amenorrhea are due to involvements of the ovaries, directly or through the influence of other glands or certain diseases. Why may we not expect symptoms of the opposite extreme, with overfunction on the part of the ovaries, if they produce a congestion or hyperemia of so marked a nature that only slight disturbances in the uterus are necessary to result in menorrhagia or metrorrhagia? Some of these cases seem to be due to a too rapid and sudden maturation of the ovary. There is often a hereditary tendency, the mother having undergone similar troubles. This condition may be a family trait, and may represent an inherited instability of the glands of internal secretion. Metrorrhagia may be due to a hyperemia resulting from hyperfunction of the ovaries and may be accentuated by masturbation. The normal uterus, lined with a normal endometrium, resists the premenstrual congestion up to that certain point when menstruation begins. The greatest wonder is that this occurs with such marked periodicity, and that the flow lasts a certain time and then ceases because the endometrium is bled, the uterine wall contracts, and that substance secreted by the ovaries which is responsible for menstruation is thrown out of the system. If, then, we are dealing with an abnormal endometrium, especially of the adenoid type, or if the uterus has lost its elasticity, and if its contractile power is diminished, then even a normal

ovarian congestion may, with perfectly understandable ease, produce menorrhagia or metrorrhagia. I observe these excessive bleedings very often in women in the late thirties and early forties, and they are usually healthy, well-developed women. I have hysterectomized a large number of these; large enough to have my attention attracted to the fact that they have large, plump ovaries, and I have long since come to the conclusion that failure of the ovaries to regress at this period naturally prevents the uterus from undergoing atrophy, and the associated persistence of marked premenstrual congestion within a uterus of lessened elasticity readily explains the frequent bleedings to be found in the preclimacteric period.

Definition.—Excessive or prolonged bleedings from the uterus, which follow more or less the regular four-weekly rhythm of menstruation, and which are associated with the local and constitutional symptoms of menstruation, are called *menorrhagia*, whereas bleedings which are of an irregular, intermenstrual character are called *metrorrhagia*. The two often so run into each other that the bleeding cannot be called either menstrual or intermenstrual, but is called an irregular bleeding (Winter).

In the discussion of those cases where regular profuse bleedings have occurred for some time, the element of existing pregnancy, impending abortion, ectopic gestation, and placenta prævia can, as a rule, be excluded.

We are dealing in menorrhagia with excessive menstrual bleedings, which, according to Winter, imply *conditions which increase and lengthen the four-weekly congestive hyperemia, or conditions which do not cut this hyperemia short.* Inflammatory conditions about the uterus, fibroids, "endometritis," atrophy or atony of the uterine wall, subinvolution fibrosis, and metritis are to be considered.

Periuterine Inflammation.—Inflammatory involvement of the ovaries is productive of irregular bleedings. Acute pyosalpinx in its earlier stages also causes hemorrhage from the uterus. The existence of parametritis or a stump exudate causes congestion in the uterine structures and irregular hemorrhages. Sometimes acute or chronic pelvic inflammation or pelvic exudates are productive of regular bleeding because, in addition to an acute or

chronic inflammation of the uterine lining and its wall, there is congestion and exudation about the uterus.

Inflammation of Endometrium.—Involvement of the endometrium associated with bleedings may be also the sequela of infectious diseases, such as typhoid, pneumonia, influenza, scarlatina, etc., which produce structural changes and hemorrhagic endometritis. Chronic endometrial hyperemia is often increased by inflammatory conditions about the uterus. With any inflammation of the endometrium the interstitial tissue is infiltrated with small cells in proportion to the severity of the inflammation. The round cells completely replace the original cells of the interstitial tissue in certain areas, so that gland sections are absolutely surrounded by small-celled infiltration. The epithelial cells of the glands proliferate in certain areas as a result of the increased blood-supply. The small round cells become larger and epithelioid in form through the increased nutrition due to the newly formed vessels present with inflammation. In the early stages, the entire mucous membrane is thickened, there is marked hyperemia, and the endometrium looks extremely red.

Overgrown Endometrium.—An overgrown hyperplastic endometrium, whether the result of such inflammation or of subinvolution after labor or abortion, or of retention of decidua, of the form of the so-called fungoid, hyperplastic "endometritis," is very frequently productive of regular uterine bleeding. The vessels may show no change, they may be dilated, there may be hemorrhage in the tissue, the walls of the capillaries may be thickened, the entire endometrium may evidence so much blood as to deserve the name of apoplexy. The vessels and capillaries of the endometrium may be brittle and show changes of an arteriosclerotic nature, so that menstrual bleeding is controlled with difficulty. With these changes of the endometrium the uterine wall is often altered, but not always *thickened.*

Changes in the Uterine Wall.—A point of importance is the necessity of considering the affections of the endometrium in conjunction with changes in the structure of the uterine wall. If we are dealing with an endometritis inflammatory in its character, we must consider that the same bacteria or cocci may, and probably do, involve the uterine wall, producing changes there

in the character, amount, and structure of the component elements, and that this alteration in the function of the uterine wall has a bearing on the symptoms supposedly or actually associated with the involvement of the endometrium alone. On the other hand, changes in the ovaries (trophic centers) or such changes as are associated with pregnancy in the tube or uterus, may likewise produce alterations in the uterine wall. The important changes in the uterine wall from a non-inflammatory cause are those changes known as *subinvolution*, which means hypertrophic and fibrotic alteration in the uterine wall with consequent modification of the symptoms supposedly or actually associated with alterations of the uterine lining.

There are alterations in the structure of the uterine wall, with or without enlargement of the uterus, which are of a nature like those affecting the muscle of the heart. There may be atony or atrophy of the muscle fibers. The uterine wall is structurally changed by numerous labors and abortions. The elasticity of the muscle fibers is diminished, their place is taken by fibrous connective tissue, there is a new-growth of connective tissue, or newly grown elastic fibers of poor contractile force have appeared. The uterine wall may be infiltrated as a result of acute or chronic inflammatory involvement and there are muscle fibers of poor contractile power or newly formed infiltrating tissue, with consequent inability on the part of the uterus to contract and to close the vessels. As the consequence of numerous labors and abortions, there is found, especially about the climacteric age, an involvement of the vessels characterized by changes in the intima and adventitia which makes them brittle. Such an arteriosclerosis with lack of elasticity and lack of contractility renders capillary and arterial hemorrhage easy.

Uterus Not Enlarged.—A change in the uterine lining productive of hemorrhage, with a uterus not enlarged, is the result of a hyperplastic endometrium or of an endometritis both glandular and interstitial, or of a beginning carcinoma. The use of a sound may exclude these conditions if the endometrium feels smooth. *A test curettage must be done if carcinoma is suspected.* The clinical history is of greater importance than the finding obtained by the use of the sound. If the endometrium is not involved, the

uterine wall may be the responsible factor, through atrophy or atony of the muscle fibers or through sclerosis of the blood-vessels.

In women who have never been pregnant menorrhagia may be due to uterine congestion. In *rare* cases retroflexion may be responsible for menorrhagia. Fibroids when small cause menorrhagia, and even when large only cause menorrhagia if they are interstitial or subserous. "Endometritis" hyperplastica is also a cause. A not infrequent cause in women who have not been pregnant is tubo-ovarian inflammation. In some cases a polyp may be the cause of menorrhagia. These conditions of uterine congestion and displacement, endometritis, inflammation of the adnexa, and polyps all produce exaggerated four-weekly congestion.

Menorrhagia which occurs with retroflexion generally means a congestion associated with subinvolution or with fibrosis, or it may mean "endometritis" hyperplastica, or both. When regular profuse bleedings are associated with a chronic catarrh, inflammatory endometritis or metritis is probable. If there is no catarrh, and if there are no evidences of inflammation, the condition is either hyperplastic endometrium or a structural change in the uterine wall. The use of the sound, the size of the uterus, and the amount of material obtained by a curettage give proof as to which factor is important.

Enlarged Uterus.—With regular increased bleeding from an enlarged uterus it is important to exclude the retention of fetal or decidual structures and the rare occurrence of menstrual bleeding in pregnancy. The other forms of regular bleeding from an enlarged uterus indicate involvements of the wall due to chronic metritis or subinvolution, or to myoma or large polyps. Though sarcoma and carcinoma generally cause irregular bleedings, the diagnosis should not be made from this irregularity alone.

The subinvolution occurring after labor or abortion, with or without associated inflammation, if not corrected, results in chronic hyperemia, in a large cavity which offers no obstacle to the periodic swelling of the endometrium, and in a muscle wall of diminished contractile power. As a consequence the flow of blood is not cut short and excessive menstruation occurs. Associated with this condition may be dysmenorrhea, which is due either to expulsion of large clots by increased contractions, or else it may be

due to inflammatory changes. More frequent than simple subinvolution after a labor or abortion is chronic subinvolution complicated by *fibrosis*, a change which implies the formation of new connective tissue in a uterus which has gone through *labor* or abortion without complete involution. Here, too, there is a large uterine cavity, there is no resistance to the swelling of the mucosa, the vessels are not compressed by the uterine wall, there is atony of the uterine wall, and there is arteriosclerosis.

Fibroids.—The symptoms which fibromyomata produce are increase in size of the uterus, generally with enlargement of the uterine cavity; bleeding, especially in the submucous and sometimes in the interstitial variety. (They rarely produce pain, unless incarcerated beneath the promontory of the sacrum, or unless the blood which is poured out coagulates quickly and is expelled from the uterus as large clots.) Fibromata in their growth are surrounded by a zone rich in blood-vessels, for in the fibroid itself the blood-supply is poor. Either this zone comes close to the surface of the uterine lining or else the mucosa over the fibroid is in a state of hyperplastic development, or else it is thinned out, or else the surface of the fibroid projects, in broad-based or polypoid form, into the cavity of the uterus. Under such circumstances bleeding, which is generally of the form of menorrhagia, may sometimes take the form of metrorrhagia. Hemorrhage is most marked in the submucous or polypoid form. In fibroids situated interstitially, and especially subperitoneally, irregular bleeding is rarely a symptom. They evidence themselves then mainly through the increased size of the uterus and through pressure-effects on the surrounding structures, such as intestine or rectum, bladder or ureters.

In addition to hemorrhage, which may be of the form of either menorrhagia or metrorrhagia, there may be pain through weight and pressure of the fibroid, there may be dysmenorrhea due to the expulsion of large clots through the cervix, or there are evidences of pressure on the bladder, ureters, rectum, or sacral nerves. Incarceration within the pelvis of uterine and especially of cervical fibroids may compress the bladder, causing great distention of that organ with pain and constant dribbling of urine.

An interstitial myoma or fibroma being situated in the wall of

the uterus is covered with muscle fibers. The diagnosis from chronic metritis or fibrosis is difficult if the uterus is small. In chronic metritis the uterus is evenly enlarged, the corpus and fundus are both thickened. If a sound is passed into the uterus and the uterus is palpated through the abdomen, by manipulation of the sound the even or uneven thickening of the uterine wall may be noted. The larger the uterus and the harder the uterus, the more probable is the existence of fibromyoma. The uterus is then enlarged, the cavity is lengthened and widened. An interstitial myoma of the cervix gives an irregular knotty wall. With an even enlargement of the uterus by a fibroid the diagnosis from pregnancy in the early months is often difficult, especially from pregnancy with dead fetus. With a living fetus the most important sign is the change of consistence which the uterus undergoes in the course of a few minutes under bimanual examination. The myomatous uterus is usually harder. In the later months the symptoms of pregnancy and the evidences of fetal movements and the beating of the fetal heart make the diagnosis.

A not infrequent differential diagnosis is to be made from retrouterine hematocele. The latter, however, becomes harder and harder after the blood has coagulated and causes peripheral adhesions and is more closely connected with the pelvic wall. In differentiating an intraligamentous fibroid from intraligamentous hematoma it is to be noted that the latter shrinks gradually. With myoma the uterus is enlarged, but in many cases the differential diagnosis is difficult and can only be made after continued observation. A retrouterine fibroid must be distinguished from the retroflexed fundus by rectal examination and by the use of the sound.

Submucous fibroids, whether broad-based or pedicled, grow toward the uterine cavity and are covered with mucosa. If such a fibroid grows into the uterine cavity, it dilates the uterus and the cavity is lengthened and widened. It stimulates the uterus to contraction, which may cause the fibroid to protrude from the cervix as a fibrous polyp. The submucous type causes much bleeding. The uterus is enlarged and round, the portio is felt to pass over into the enlarged uterus. A submucous fibroid often dilates the cervix and the lower uterine segment like a balloon. A differen-

tial diagnosis must be made from pregnancy and from metritis. The cervix is dilated during menstruation, and if the finger is then passed into the cervix, a foreign body is felt in the case of a submucous fibroid. This must be differentiated from an ovum or the retained products of an abortion. It must be remembered that an ovum or any of its retained parts may be loosened from the wall of the uterus by the examining finger, whereas a fibroid cannot. A retained placenta may be so firmly adherent as to be diagnosed as fibroid. Mucous polyps are to be diagnosed by the fact that they are oval, lobulated and soft, and have a thin pedicle.

Metrorrhagia.—Metrorrhagia is a bleeding of different type. There is either too short an interval or else the bleeding lasts very long. It is due to abortion, ectopic gestation, *fibrosis uteri*, arteriosclerosis, fibromyoma, polyps, sarcoma, or advanced carcinoma.

Important causes of metrorrhagia are new-growths, (1) associated with pregnancy, an ovum in the uterus or in the tube, or placenta prævia or chorioepithelioma, or (2) tumors not associated with pregnancy, such as polyps, fibroids, sarcoma, carcinoma. When fibroids become larger, and especially if they are submucous or polypoid, the bleeding may become intermenstrual. Therefore continued metrorrhagia is generally due to actual diseases of the uterus itself. As Winter says, intermenstrual bleeding speaks for permanent structural changes. Therefore in numerous cases we are dealing with new-growths, or with polyps, in instances of long-existing bleedings. When an intermenstrual bleeding first takes place and is seen for the first time, abortion and ectopic gestation should first be considered.

New-growths, Including the Ovum.—Many cases of metrorrhagia from an enlarged uterus, aside from those instances due to metritis or subinvolution fibrosis, are due to the presence of foreign growths. A carcinoma in the early stages by no means implies an enlarged uterus. *It produces only an oozing and a discharge of sero-sanguineous fluid*, but in the later stages arrosion of blood-vessels may be associated with profuse hemorrhage. The same holds good for sarcoma, and especially for chorioepithelioma, in which the tendency to the erosion of blood-vessels is extremely marked. Fibroids which have about them a zone of tissue rich in blood may be productive of great bleeding, especially if this area is situated

close under the mucosa or if the fibroid thins the mucosa over it. In addition, the presence of a fibroid prevents the uterus from contracting and limiting the hemorrhage. Polyps may cause profuse bleeding from open vessels. So rich is the blood-supply of a polyp that the bleeding may be most profuse. A uterus enlarged by the presence of an ovum which is being expelled or which is retained in whole or in part, or in which a low embedding has resulted in placenta prævia, is a very frequent cause of bleeding. So long as the ovum, or part of it, is still attached, vessels or capillaries are open, thrombi do not form, the uterus cannot contract, the bleeding continues. A tubal gestation is almost invariably interrupted by bleeding in the tube, by tubal abortion, or by tubal rupture. This interference with the life of the ovum causes the expulsion from the uterus of the decidua by uterine contractions. Hence oozing, irregular bleeding, and in the later stages the expulsion of decidua occur.

Single Strong Bleedings.—A single strong bleeding occurring for the first time must always be viewed as a possible abortion or as an ectopic gestation, and these conditions must be differentiated or excluded by examination. Such a single strong bleeding, according to Winter, not infrequently takes place as the first menstruation after labor, or the first menstruation after a long period of amenorrhea. Here the history and size of the uterus are of importance. Examination in such cases by a sound shows the uterus to be clean. In this first bleeding occurring after a completed labor or abortion, the large cavity of the uterus offers no obstacle to the swelling of the mucosa, the uterus has not regained its contractile power, and prolonged hemorrhage may take place. The other conditions related to pregnancy which must first be excluded are abortion, ectopic gestation, and placenta prævia.

Ectopic Gestation.—Most cases of ectopic gestation present a group of symptoms preceding the *tragic* stage of diseases sufficiently distinctive to warrant a diagnosis, and since these symptoms are in no way alarming, they are called the non-tragic symptoms of ectopic gestation. The two symptoms of greatest value are: (*a*) atypical menstruation or metrorrhagia, (*b*) pains.

Atypical menstruation of ectopic gestation means the appearance

of blood generally out of rhythm with the normal menstrual cycle of the individual. The amount of blood lost may be very much greater, or very much less, than the usual menstrual flow of the patient. It may be continuous or appear with interruptions. It may be darker or may be lighter or more brownish than the usual menstruation. The metrorrhagic blood of ectopic gestation very often has a slippery character almost sufficient at times to diagnosticate ectopic gestation by the effect of such discharge upon the tactile sense.

The colicky sharp pains of ectopic gestation are generally closely attended by the appearance of a bloody discharge from the vagina. If the patient is intelligent, she will at once know wherein the pains and the flow of the present attack differ from her previous and painful menstruations. If the colics are very severe, with steady pains between them, the abdominal walls may be rigid. The colics in the beginning of tubal pregnancy are often mistaken for intestinal pains. They may not cause the patient to rest more than momentarily from her work or pleasure. Except for brief intervals of an hour, or a few hours or so, *a large proportion of the cases of ectopic gestation pursue their usual vocations during the non-tragic stage without material or prolonged interruptions* (Harris).

Morning sickness and enlargement of the breasts, which are the ordinary symptoms of intrauterine pregnancy, do not belong to the symptomatology of extrauterine pregnancy. Miscarriage is often diagnosed by the patient or another physician. If the patient is still bleeding and has pains, we should be slow to accept such statement, unless a fetus has actually been seen by some one. Twenty per cent. of the cases of ectopic gestation are subjected to the operation of curettment for the cure of metrorrhagia, the real cause of the metrorrhagia not having been suspected (Harris).

In the non-tragic stage the pregnant tube is usually sufficiently large to be palpated, and possibly also approximately measured by bimanual palpation. A pregnant tube is always tender when squeezed, and may be extremely painful when so treated. The tube may be embedded in blood-clots, or so displaced or partly or completely engulfed in blood as not to be made out.

When any woman after puberty and before menopause who has

menstruated regularly and painlessly goes four, five, six, eight, ten, fifteen, eighteen days over the time at which menstruation is due, sees blood from the vagina differing in quality, color, quantity or continuance from her usual menstrual flow, and has pains, generally severe, in one side of the pelvis or the other, or possibly in the hypogastric region, ectopic gestation may be presumed (Harris).

Uterine Abortion.—The symptoms of abortion are bleeding, pain caused by uterine contractions and by dilatation of the cervix, and local cervical evidences of an attempt at expulsion of the uterine contents. The bleeding is either the primary or the secondary factor. It is primary if a hemorrhage takes place which acts as a mechanical factor in separating the ovum. It is secondary if the ovum dies or is partly separated and, being then a foreign body, the uterus contracts in its attempt to expel it. Uterine contractions continue to separate the ovum, more bleeding takes place between ovum and decidua serotina, and blood is poured out of the cervix. The pain associated with abortion is due to uterine contractions and to cervical dilatation, and for exactly the same reasons as at full term. The uterus contracts close down upon the egg, blood accumulates in the uterus, the uterus contracts to expel the blood, and this process may loosen the unruptured ovum entirely from contact with the uterine wall. Not only the uterine contractions but also dilatation of the cervix produces the pain. The degree of dilatation of the cervix, then, is one of the means of determining whether abortion is progressing or not. Given a uterus which is bleeding, in which pain is slight, in which the cervix is not dilated, and we are here concerned with a case in which the bleeding and the progress of the abortion may under proper treatment cease. If, however, bleeding continues, it threatens the life of the ovum. If the blood which is poured out accumulates in the uterus in the form of clots, it stimulates the uterus to further contractions. If the ovum is partially separated from the uterine wall, or if the embryo is dead, the uterus naturally reacts by further contractions. Therefore, the continuation of uterine pain and the increasing dilatation of the cervix are indices of an inevitable abortion.

An inevitable abortion is associated with the loss of much blood and of fresh blood, whereas irregular bleeding or the loss of brown-

ish blood mixed with mucus does not indicate immediate danger. When, in addition to the loss of fresh blood, pains come on, this combination has a more direct meaning. If at the same time the uterus becomes more tense or becomes harder, it indicates that abortion is in progress. If, then, the cervix is open and the internal os admits one finger, we are concerned with dilatation of the cervix, which is a most important sign of inevitable abortion.

Hegar's sign is important in those early cases seen for the first time, and in whom pregnancy has not been previously diagnosed; especially so if there is a history of long-continued irregular menstrual periods and if ectopic gestation is suspected. An important aid is the introduction of the finger into the uterus when the cervix is open. In beginning abortion the finger feels the round ovum more or less cystic. In incomplete abortion the finger feels retained villi or decidua or retained placenta, which are recognized by the fact that they can be peeled off with the fingers. Sometimes such structures are seen projecting from the cervix.

Menstrual bleeding in the course of uterine pregnancy may be due to a double uterus, to endometritis, to the coexistence of a fibroid, polyp, or carcinoma. Spotting or bleeding in the early weeks or months of a pregnancy means endometritis deciduæ or ectopic gestation.

Chorioepithelioma.—Chorioepithelioma occurs from six weeks to three years after labor or an abortion. (It never occurs in a nullipara.) In 50 per cent. of the cases it follows the occurrence of hydatid mole.

The clinical symptoms are: (1) Pronounced uterine hemorrhage recurring even after repeated curettings; (2) very early metastases, especially in the lungs and vagina; and (3) early death through hemorrhage, cachexia, or septic infection. Macroscopically, these tumors are more or less localized, ulcerating, degenerating, hemorrhagic growths, frequently passing deeply into the uterine wall, or through it, with involvement of the peritoneum. Microscopically, these tumors are characterized by hemorrhagic areas, areas of degeneration, the presence of fibrin, and the involvement and invasion of capillaries and large vessels. The diagnosis is verified by the microscope. (See section on Chorioepithelioma.)

Arteriosclerosis and Fibrosis Uteri.—When menstruation becomes severe and menorrhagia or metrorrhagia gradually develop, and no local changes in the endometrium can be observed with a sound or with the examining finger, we may take it for granted that one or more of the following conditions are present: (1) Degenerating muscle fibers poor in contractile power; (2) an increased amount of fibrous connective tissue; (3) an increased amount of elastic fibers, thickened and brittle; (4) arteriosclerotic vessels. Age is no criterion, since these changes may occur long before the natural climacteric period. If ergotin, stypticin, etc., are of no avail; if no decided changes in the adnexa sufficient to warrant their being considered the causal factors are found, and if curetting shows no altered condition of the endometrium; and if, above all, *a thorough curetting does not control the hemorrhage*, then the diagnosis of muscular degeneration, fibrosis uteri, or arteriosclerosis may be made.

Arteriosclerosis.—Arteriosclerosis seems relatively frequent in women in the preclimacteric age. There seems to be a connection with frequent pregnancies, especially if following each other closely. In other cases there is a myomatosis or fibrosis uteri. We know from experience after castration that, on cessation of the ovarian secretion, there is an alteration in the thyroid and certain symptoms of hypersecretion of the hypophysis, the same as after removal of the thyroid. The cessation or hypofunction of thyroid and ovary stimulates the adrenals, an effect which is supported through the hyperfunction of the hypophysis. It is a question whether there is a connection between such changes in the secretion of various internal glands on the one side and the preclimacteric arteriosclerosis on the other side. The vessels of the genitalia, and especially the uterus, are favorite areas for arteriosclerosis in women. Only in half the cases are signs of arteriosclerosis found in the other parts of the body. This arteriosclerosis of the uterine vessels may cause decided bleedings. There may, however, be no changes in the muscle or vessels to account for metrorrhagia. There may be no changes in the mucous membrane, but there may be disturbances in the internal secretion of the ovaries.

DIAGNOSIS OF THE CAUSE OF METRORRHAGIA

In making the diagnosis it is important to consider the various aids. The sound shows the size of the uterine cavity, the smoothness of the lining, the presence of foreign bodies, or the sensitiveness of the lining.

Pain is associated with abortion, ectopic gestation, with the expulsion of clots, or with an inflammation. Purulent and mucopurulent discharge from the uterus or cervix speaks for an inflammatory condition. We should consider the meaning of a previous amenorrhea. We should question as to the influence of cohabitation, which in carcinoma produces an oozing. We should take into consideration the history of previous abortions and labors and should take cognizance of the age of the patient, and most especially the history of *bleeding following a period of amenorrhea* at the climacteric age. The character of the blood is of importance. A fresh gushing hemorrhage speaks for an open vessel, and is found in abortion, malignant degeneration, and with polyps. The presence of pieces of blood or coagula implies a bleeding so rapid that the uterine secretion cannot prevent the clotting. It is observed in fibroids, with carcinoma, with polyps, and with abortion. A dirty, brown-red discharge means long retention in the uterus, and is frequently seen in conditions related to pregnancy. A syrupy, thick discharge means hematocolpos.

When irregular bleedings occur in a patient without leukorrhea in whom there is no evident cause for hemorrhage, if the endometrium is normal, if the adnexa are not inflamed, and if there is a history of frequent labors, especially so if the patient is about the menopause age, metritis, fibrosis uteri, or arteriosclerosis are the responsible factors.

Those causes which before the climacterium cause hemorrhage through hyperemia of the mucous membrane (interstitial endometritis, myoma, periuterine inflammation, and circulatory disturbances) are of little moment after menopause. The bleedings which occur in this post-climacteric stage may be due to ulceration, erosions, colpitis senilis, mucous polyps, submucous myomata, etc., but 65 per cent. of the cases of bleedings in the post-climacteric period are due to carcinoma.

In the early stages of carcinoma the diagnosis can often be made only by microscopic examination. *A test excision or test curettage should be made in every doubtful case*, since the clinical symptoms alone are such as to suggest a probable diagnosis of "chronic metritis," "endometritis," "erosion of the cervix," "ulcers," etc. "Chronic endometritis with long-continued profuse menstruation" is a frequent diagnosis when there is really carcinoma of the fundus either circumscribed, diffuse, or polypoid in form. Corpus carcinoma is characterized by its slow, localized development, and may be for months or even years confined to the uterus itself, with very slow or late extension into the broad ligament.

TREATMENT

The *treatment of carcinoma and sarcoma* of the vagina is surgical in those cases seen sufficiently early to permit the removal of the entire vaginal wall together with the uterus and the adnexa. In more advanced cases nothing can be done except to carefully curet ulcerating degenerating areas, to cauterize them with the actual cautery, and to keep them as clean and dry as possible.

The treatment of uterine carcinoma is operative, in cases with none or very little extension into the parametium. Palliative treatment in non-operative cases means curetting away of the carcinomatous tissues of the cervix, followed by the application of the actual cautery, followed by a packing of the resulting cavity with cotton covered with equal parts of iodoform and tannic acid. Care should be taken to avoid, during the curetting, perforation of the bladder, rectum, or ureter.

The *treatment of chorioepithelioma* is surgical.

The *treatment of polyps*, whether of the cervix or uterus, means their actual removal. Polyps of the cervix may be removed, under strict aseptic precautions, by the cutting of the pedicle, followed by the application to the stump of carbolic acid or nitric acid or the actual cautery. Polyps of the uterus, if small, should be curetted away. If large and situated near the fundus, or if of broad base, their removal implies a delicate surgical operation, not infrequently combined with a long incision of the anterior

wall of the cervix and uterus to permit of direct approach to the polyp.

The *treatment of abortion* is given on page 279.

The *treatment of ectopic gestation* is entirely surgical.

In any of the bleedings associated with the *acute infectious diseases* the vagina should be douched daily with a 1 per cent. carbolic acid solution, and subsequent observation should be directed to the prevention of atresia.

In *senile vaginitis* the mucous membrane is often very thin, extremely red and congested, and often eroded. The slightest force on examination, or the use of specula, causes bleeding. Senile vaginitis should be treated by regular vaginal bathings with pure pyroligneous acid three times a week, carried out through the Ferguson speculum, combined with daily douches consisting of a tablespoon of pyroligneous acid to each quart of water.

Erosions are sometimes so sensitive and contain so many capillaries that any but the most gentle touch will cause oozing and bleeding. Erosions are best treated by the local application of pure carbolic acid, followed by a thorough painting with tincture of iodin, followed by boroglycerin poured into the vault of the vagina, after which the vagina is packed with gauze. In the later stages solutions of nitrate of silver stimulate the healing process.

The following drugs are used in the treatment of uterine bleedings.

Ergot has the effect of contracting blood-vessels and has an especial value in producing contraction of the uterine muscle. It is decidedly valuable when the uterus is atonic or dilated as a sequence of pregnancy or abortion. It naturally has a much diminished influence when the muscular elements of the uterus are degenerated or replaced by fibrous connective tissue. Ergot contracts the uterine muscle and raises the blood-pressure. It finds its most frequent application in overcoming or avoiding post-partum hemorrhage, in aiding the emptying of the uterus in abortion, and in aiding involution of the uterus. It should be used sparingly in the first week after labor, as it has a tendency to diminish or stop the secretory function of the breasts. Ergot requires from fifteen to twenty minutes to produce a result when given by the mouth. *Ergotol* is two and one-half times as strong as the

fluidextract of ergot and it works especially well and rapidly when given by the needle. Ergotin (Bonjean) in doses of 2 to 5 grains has an excellent effect on the uterine muscle, but acts more slowly and more continuously. It is, therefore, well adapted for long-continued use and in cases not requiring an immediate rapid contraction of the uterus.

Hydrastis acts upon the vascular system as a vaso-constrictor and causes a general rise in blood-pressure. It has also the power to produce uterine contractions. Hydrastis is of value in all forms of hemorrhage from the uterus, and has, in addition, a stimulating trophic effect on the uterine muscle. The dose of the fluidextract is one-half to one dram several times daily. Hydrastinin hydrochlorate is of value in menorrhagia and metrorrhagia and also in some cases of dysmenorrhea. The dose is half a grain to a grain in capsules several times daily.

Stypticin (cotarnin hydrochlorate) arrests hemorrhage by an astringent action or by directly affecting the blood. It is a hemostatic and uterine sedative. It is most efficacious in bleeding not due to incomplete abortion or new-growths. It is of especial value in prolonged or profuse menstruation. It is also a powerful local hemostatic. The dose is 2 to 4 grains four to five times daily. A 10 per cent. watery solution can be readily given by the needle.

Styptol (cotarnin phthalate) is a hemostatic and sedative, but is said to cause a rise of blood-pressure. It is highly recommended by Carl Abel as a uterine hemostatic, and especially as a sedative. It is used by him (1) in profuse menstruation in young girls and nulliparæ, (2) in climacteric hemorrhage, (3) in bleeding during pregnancy, (4) in the hemorrhage due to myomata, (5) in the hemorrhage coming from carcinoma, (6) in dysmenorrhea, being then given between the menstrual periods. The drug is best given in the original sugar-coated tablets, containing 0.05 gm., five to eight times daily.

Suprarenal extract has some value in uterine hemorrhage in the dose of 2 to 4 grains several times a day. Suprarenal extract given internally, in addition to its action on the blood-vessels, probably causes uterine contraction. Adrenalin solution (1 : 1000) may be given in dose of 10 to 30 minims by mouth, or smaller doses by needle.

Some cases of profuse, continued, irregular bleedings, especially

when due to myomata, are benefited by the administration of *chlorid of calcium*. 40 grains in solution being given daily to increase the coagulability of the blood. Milk is to be avoided during its use.

Thyroid extract is sometimes of service in menorrhagia and endometritis by diminishing uterine congestion and hyperemia. *Thyraden* may be given in the dose of 2 to 4 grains three times daily. The dose of iodothyrin is from 5 to 10 grains three times a day.

℞. Stypticin..... gr. ij
Ft. tal. tabell. no. xx.
S.—One every two hours.

℞. Stypticin..... gr. ij
Ergotin..... gr. ij
Ft. tal. caps. no. xx.
S.—One every three hours.

℞. Stypticin..... gr. ij
Ergotin..... gr. ij
Suprarenal ext..... gr. ij
Hydrastinine hydrochlor..... gr. ss
Ft. tal. caps. no. xx.
S.—One every four hours.

In some cases of long-continued hemorrhage, where stimulation of the heart is advisable, *digitalis* is a drug of value. The infusion, especially in the dose of an ounce and a half, is said to cause contraction of the uterus in menorrhagia.

In all cases of *masturbation* efforts directed toward the stopping of this habit are of avail only when the patient's attention is called to its risks and dangers. Coitus interruptus and excessive coitus are conditions to which attention must be paid, for these are elements which serve to produce an excessive congestion of the genital tract or a congestion not relieved by the sexual orgasm.

Menorrhagia due to *retroflexion* may be corrected by reposition of the uterus to its normal position. This is best done by the use of a Hodge or Smith pessary. The use of the pessary must often be preceded by treatment which gradually elevates the uterus and puts any contracted ligaments, such as the uterosacral ligaments, on the stretch. This is best done by introducing pure boroglycerin into the vagina through a bivalve speculum and thoroughly packing the posterior fornix and vagina with gauze. For this purpose it may be necessary to pull the cervix down with the aid of a volsella, or it may be necessary to put the patient in the Sims posi-

tion or in the knee-chest position. The anterior fornix and the vagina are also packed with gauze. This procedure, carried out three times a week, elevates the uterus, diminishes congestion through the elevation of the uterus and through the action of the glycerin. Whenever the uterus can subsequently be readily brought by bimanual manipulation into a normal position, with the cervix high up and far back, a suitable pessary may be introduced. It is to be worn only if the patient experiences no pain or discomfort. If the pessary then relieves the annoyances, an Alexander operation, a Gilliam operation, or any method which shortens the round ligaments will permanently retain the uterus in a position which prevents that congestion which may have existed as a direct result of the retroflexion. Stypticin, ergotin, and suprarenal extract should be given during menstruation.

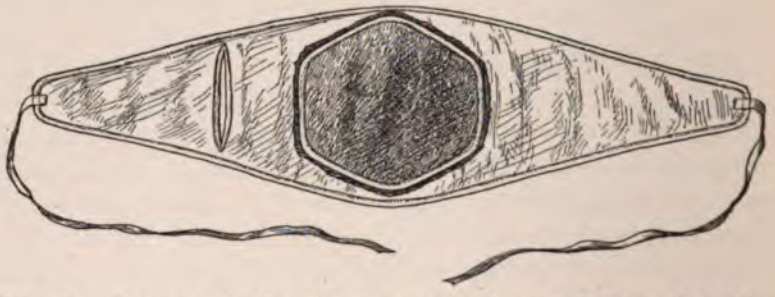

Fig. 115.—Abdominal bandage for moist applications to abdomen during the night.

Pyosalpinx, *salpingitis*, *parametritis*, and other inflammatory conditions about the uterus which produce excessive congestion, with or without compression of the blood-vessels, can be medically treated by rest and the avoidance of effort, by the wearing of an elastic abdominal bandage for the purpose of giving intra-abdominal support. Hot douches, for their effect on the pelvic circulation, are of importance. Sitz-baths containing 3 to 4 pounds of sea salt and 3 to 4 ounces of calcium chlorid, taken for a period of fifteen to twenty minutes at body-temperature, a half-hour before retiring, have an important action in stimulating the pelvic circulation and in diminishing edematous and exudative changes. Full Nauheim baths, when they can be taken, have a still better action

than the sitz-baths. At night there should be applied to the abdomen a moist flannel bandage covered with oiled silk or with chamois skin and left in place during the night (Fig. 115). Three times a week boroglycerin should be introduced into the vagina through a bivalve speculum and the fornices should be then packed with gauze, which is also gently packed into the entire vaginal canal. Stypticin in large doses should be given for the bleeding.

Endometritis of an inflammatory nature is almost always associated with inflammation about the uterus. Whether it is or not, the treatment is the same as that just mentioned for pyosalpinx or periuterine inflammation. Stypticin should be given in large doses.

Metritis of an inflammatory character demands the same treatment as that suggested for periuterine inflammation. In the early cases sitz-baths or Nauheim baths are sometimes of very great value.

The removal of *retained membranes or placental structures*, or of part of a placenta or of a complete placenta, demands thorough dilatation of the cervix, with or without the splitting of the cervix by the Dührssen method of minor vaginal cesarean section, with a thorough examination of the cavity of the uterus (if sufficiently large) by the examining finger and a removal of all that is possible with the aid of the finger supplemented by the use of the placental forceps and the curet. In those cases where menorrhagia is due to probable retention of decidua, ergotin and stypticin should be given for several weeks if curetting is refused or contra-indicated.

Endometritis (whether inflammatory or not), which is of the character known as glandular or hyperplastic endometritis, should be treated by intravaginal pressure therapy. Pelvic anemia should be produced by abdominal applications and by sitz-baths. It is particularly in the non-inflammatory cases that ergot, hydrastis, styptol, stypticin, and suprarenal extract are of very great value. If these fail, curetting can be done, often with marked benefit, in the cases that are not inflammatory in nature. In those cases in which a uterine or periuterine inflammation is present curetting should be done only if the bleedings are so marked as to seriously

jeopardize the patient's health. It goes without saying that rest in bed during menstruation is of great importance.

Rest in bed and the avoidance of any effort, together with the hot-water bag applied to the spine, are very essential procedures in the treatment of uterine hemorrhage. Short hot vaginal douches are often of value. In some cases of continued menorrhagia energetic scarification of the cervix before menstruation may diminish the amount of blood lost subsequently. In many cases a curetting must be done. In those cases associated with hyperplastic endometrium after curettage subsequent applications to the uterine lining are of value. Among the topical applications to the endometrium are liquor ferri sesquichlorati, pure tincture of iodin, 50 per cent. solution of carbolic acid in alcohol, 10 to 20 per cent. chlorid of zinc. Martin uses 1 c.c. of the iron, injecting it drop by drop as the syringe is drawn out. It is well to use a Braun syringe covered with cotton. The uterus is then irrigated and gauze is placed only in the vagina.

Subinvolution, when seen in the early stages, demands the use of hot douches, vaginal treatment by glycerin and gauze, each vaginal treatment being preceded by a thorough painting of the vault of the vagina with tincture of iodin. The uterus should be made to return to its normal size by continued small doses of ergot, ergotol, or ergotin combined with hydrastis, to which preparations stypticin, styptol, and suprarenal extract should be added during menstruation.

Subinvolution after labor or abortion, where the evidences of uterine atony are marked, warrants the use of hot vaginal douches of 1 to 3 quarts, cool sitz-baths of a duration of five to thirty minutes, massage of the uterus, and, best of all, a complete course of Nauheim baths. Malposition should be corrected and there should be abstinence for a long period from sexual intercourse. In stout women the hyperemia and the associated obstipation should be treated by a cure with Glauber's salts associated with the application of the sinusoidal current and appropriate diet.

Passive hyperemia of the uterus furnishes the basis on which an inflammatory metritis is easily engrafted. In lymphatic and scrofulous women the uterus often remains large, with a profuse serous or mucoid discharge. For this condition salt baths and Nauheim

baths are especially indicated. The following combination is of value:

℞. Physostigmine salicylatis..... gr. $\frac{1}{60}$
Ergotin..... gr. iij
Euquinin..... gr. ij
Strychn. sulph..... gr. $\frac{1}{40}$
Ft. tal. caps. no. xxx.
S.—One t. i. d. for several weeks.

In *non-inflammatory metritis* or subinvolution fibrosis we are dealing with an end-stage of a previously existing congestion, and with structural alterations which diminish the contractile power and character of the muscle fibers, of the elastic connective-tissue fibers, and of capillaries and vessels of the uterus. Associated with this is also a chronic congestive state in the ligaments of the uterus and in the pelvic connective tissue and a lack of tone in the general circulatory apparatus. The treatment consists in the administration of the preparations of ergot, hydrastis, stypticin, styptol, and suprarenal extract. Sitz-baths, 50° to 65°, five to thirty minutes, or the Nauheim baths, should be given.

In some cases, those associated with *arteriosclerosis*, the sitz-baths, or even the Nauheim baths, are contraindicated when they result in increasing the discharge of blood or in bringing it on at an earlier period. In stubborn cases a curetting may be done, followed by the application of steam for three to five minutes. Some of the cases associated with marked hypertrophy of the cervix are benefited by a high amputation of the cervix, followed by curetting and atmocausis.

The treatment of those bleedings which are due to *arteriosclerosis*, with or without enlargement of the uterus, demands also the internal administration of ergot, ergotin, hydrastis, stypticin, styptol, and suprarenal extract. Very often a curetting followed by a very thorough atmocausis must be done. If this fails, hysterectomy offers the only relief.

Bleeding due to *fibroids* demands the internal administration of ergot, hydrastis, styptol, stypticin, and suprarenal extract. If these fail, a curetting or the use of atmocausis should be tried. In addition to the above-mentioned drugs, the effect of thyroid extract should be watched, as its long-continued use, if well borne without constitutional annoyances, may diminish the bleeding

and may even cause some tumors to diminish in size. Some of these cases are benefited by the administration of calcium chlorid. When these various procedures fail, myomectomy or hysterectomy offer the only relief.

The treatment of *endometritis deciduæ* means rest in bed, coupled with the internal administration of stypticin and styptol.

A *rapid loss of blood* is best treated by tamponing the vagina, and in some cases the uterus, with iodoform gauze. Hot vaginal douches or even irrigations of the uterus may be used with water at 110° to 120° F. before packing.

If the cause of menorrhagia is associated with impotence in the male or with coitus interruptus, or is produced by use of the sewing-machine or by bicycle or horseback-riding, these should be avoided. If there is passive hyperemia, obesity, or constipation, salt baths are of value after a course of Glauber's salts. Short sitz-baths, 70° to 85°, five to fifteen minutes, are also of aid.

In *chronic atony of the uterus*, found in weak women, in lymphatic women, after prolonged lactation, as well as in the form resulting from many labors in rapid succession, we use short hot vaginal douches, massage of the uterus, ergotin, atmocausis, and no curetting.

If there is an atonic, soft, thin-walled uterus, we use ergot, bimanual massage, Nauheim baths, etc.

Climacteric bleedings are best treated by atmocausis.

In bleedings occurring through unrecognized cause, and perhaps due to vasomotor disturbances, Olshausen places such patients for several hours on a hot sand-bag or a hot-water bag applied to the lower vertebræ at 110° to 120° F.

Many of the climacteric bleedings are due to atony or arteriosclerosis. Rest and tamponing of the vagina or the uterus are of value. Hot vaginal douches of 2 quarts of water are beneficial. Hot applications to the sacrum or a hot sand-bag to the lower vertebræ, prolonged cool sitz-baths, strychnin plus euquinin plus ergotin, and atmocausis are the best. For the production of uterine and pelvic anemia by abdominal applications, by sitz-baths, and by electricity see the sections on those topics. Weil and others have proved the *injection of blood serum* to be of use in hemophilia. The fresh serum of the rabbit, the horse, or the human subject may be used. In case of intravenous injection, the amount

injected daily should be from 10 to 20 cubic centimeters (2½ to 5 fluidrams); in subcutaneous injections the amount should be from 10 to 30 cubic centimeters (2½ to 7½ fluidrams). If the injections are repeated in two or three days the desired effect may be secured, whether it be the checking of an existing hemorrhage or the prevention of undue bleeding in the course of the operation, and the benefit may be expected to last for a month or more. For some reason it is dangerous to use the serum of the ox. If fresh serum of the rabbit, of the horse, or human subject is unavailable, an efficient substitute is to be found in the ordinary antidiphtheritic serum.

Busse has used such injections in persistent uterine hemorrhages in which the local findings were negative, and in which repeated curettage, etc., failed to cure. He used fresh human serum by abstracting blood from healthy patients through aspiration of the arm vein. Ten cubic centimeters of the clear serum were injected deep into the gluteal region of several patients suffering from menorrhagia or metrorrhagia. In three to four days the injection was repeated; one-half of the cases showed immediate and permanent improvement. Except for transient loss of appetite in two instances, no after-effects were noted. The serum increases the coagulability of the blood.

Dickinson believes that the *x*-ray should be used for the intractable menorrhagias of chronic metritis and all myomas requiring treatment, except those infected, degenerating, submucous, or polypoid, and those suspected of malignancy. The older the patient, the better the result. All fibroids are said to shrink. The *x*-ray is useful in cases of sexual hyperesthesia. It is most serviceable in women about forty years of age. It is of value where menstruation is to be suppressed, or where it is desirable to induce sterility.

Treatment of Abortion.—The treatment of inevitable abortion consists in reproducing the steps involved in normal labor. In labor dilatation of the cervix is aided by uterine contractions forcing the "bag of waters" into the cervix, and by the upward pull of the cervical fibers around the presenting part of the child, as if drawn around a pulley. Continued uterine pains expel the contents, and further contractions of the uterus in the third stage

loosen the placenta and expel it. Therefore the treatment of abortion consists in aiding dilatation of the cervix, in aiding the separation of the ovum and placenta, and in aiding the expulsion of the contents. At the same time the interests of the patient should be conserved by limiting the hemorrhage as much as possible. The very means which are best adapted to preventing an excessive loss of blood happen to be the very means which are of the greatest value in dilating the cervix. If an abortion is inevitable, and if it is desired to carry out the procedure in the simplest manner, the following should be done with strictest surgical aseptic precautions.

The vulva, the vagina, and the cervix should be thoroughly prepared. With the aid of a bivalve speculum or with the aid of Sims' specula the cervix should be grasped by volsellum forceps, and a long strip of iodoform gauze, its width depending on the dilatation of the cervix, should be introduced into the cervix and as much passed up into the uterus as possible. The cervix should then be packed as thoroughly as possible. The vagina, from the fornices to the introitus, should be packed with a very wide strip of iodoform gauze arranged in plaited form, thus furnishing a packing which completely and solidly fills the vaginal canal. With the aid of a T-bandage and gauze about the vulva the vaginal packing should be kept in place. Ergot, 1 dram, or ergotol, ½ dram, should be administered every two or three hours. The vaginal packing prevents the exit of blood from the uterus and hemorrhage is diminished to a minimum. Through the gauze within the cervix dilatation of the cervix is produced. As a result of the packing in the vagina and the cervix the blood thus poured out in the uterus is retained within it. Contraction of the uterus compresses this blood, the poured-out blood dilates the uterus and cervix, accumulates between the ovum and the uterine wall, and is an important factor in peeling the ovum away from its contact with the uterine wall. Contraction of the uterus and the effort of the uterus to expel this accumulation of blood dilate the cervix.

If this packing is removed at the end of twenty-four hours, the cervix will be found considerably dilated. The same steps as mentioned above should be repeated, but a wider piece of gauze should be packed into the uterus, and especially into the cervix. The vagina is then thoroughly packed and the use of the ergot is

continued. It rarely takes more than forty-eight hours with this method to dilate the cervix so that it readily admits the middle finger. At the same time the ovum and the chorionic villi or placenta are often completely loosened from the uterine wall. The cessation of uterine pains can generally be taken as proof of separation of the ovum. At the end of the forty-eight hours, then, the gauze is removed, and not infrequently the ovum is so situated that placental forceps introduced into the cervix can grasp and remove it—sometimes the fetal sac with the embryo, at other times the fetal sac and then the embryo. If the placental forceps do not grasp a loosened ovum, chloroform is generally necessary, and the middle finger, under the strictest aseptic precautions, is introduced into the cervix and uterus; the other hand, pressing through the abdominal wall, pushes the uterus down into the pelvis and presses on the fundus (Fig. 72). In this way the middle finger of the internal hand can palpate the entire uterine cavity, can separate the whole ovum or the adherent parts, or remove whatever of fetal sac or placenta is attached. After this procedure the placental forceps carefully introduced can extract whatever loosened contents are in the uterus. The uterus should then receive a very hot douche, with a double-running irrigator, of 1 per cent. lysol. If the finger has been unable to separate any of the placental tissues, their location at least is noted, and placental forceps or a large blunt curet are then introduced for their removal. The uterus is then packed with iodoform gauze and ergot is administered. The vagina is also packed with iodoform gauze. The gauze is removed in from twenty-four to forty-eight hours and the ergot is continued. In incomplete abortion it is rarely necessary to use the sharp curet unless, in very early cases, the uterus is so small that the finger method cannot be used. The use of the sharp curet is a dangerous thing: first, we are never sure that we have removed all the products of conception; second, perforation of the uterus occurs very readily. During the manipulation of the curet the uterus dilates and contracts easily, as it does in the post-partum period at full term, and if the curet is held very firmly, simple contraction of the uterus is enough to cause perforation by this sharp instrument.

It is by no means infrequent to find, in abortions at the tenth or twelfth week, that an embryo is spontaneously expelled, but decidua,

the sac of the ovum, or placental remnants are retained. These, as a rule, prevent the uterus from returning to normal size, the cervix does not contract, and there is generally a steady or irregular loss of blood. Under these circumstances the same method of dilatation of the cervix by iodoform gauze, and of examination and cleansing of cavity with the finger, is very advisable. If this procedure is not possible, the dull curet should be used with the greatest precaution. In using the curet in the uterus, it is my custom first to measure the length of the uterine cavity with a sound, and then to place the index-finger of the right hand on the curet at a point which makes the distance from the tip of the curet to the finger a little less than the length of the uterine canal, as measured by the sound. Curettage is then done, with the finger held firmly on this point, so that the instrument at no time enters further into the uterus than the measured length. The above described method of painless, slow dilatation of the cervix by the use of the iodoform gauze is the safest and wisest procedure. The above method of removing the contents of the uterus by the introduced finger is wisest and safest. The finger recognizes adherent tissues. It locates any tissue that cannot be scraped off. It cannot perforate the uterus. It makes diagnosis and carries out the treatment. It should be used in every case in which the uterus is three times the normal size.

The diagnosis is more difficult when the cervix is closed. The continuation of pain speaks for the retention of the ovum or of large masses, and bleeding continues. The uterus may be enlarged through the thickness of its own walls rather than through the size of the contents. The sound may show irregularities or roughness in the very early months, but its use causes ready bleeding. Winter says that the larger and softer the uterus, the more does it speak for the retention of fetal and decidual products.

The death and retention of the ovum and embryo in the first half of pregnancy results in a diminution of the succulence and blueness of the vagina and cervix. The uterus becomes harder. Bleeding is less frequent than in abortion. The important aid in diagnosis is observation of the fact that the uterus does not increase in size in the course of several weeks, or that the uterus is much smaller than the length of the amenorrhea warrants. The chorionic

villi may grow after the death of the embryo. Such an ovum is found to be covered by thickened decidua. Decidua serotina especially is thickened and infiltrated with blood. There is little amniotic fluid and the embryo may be present or degenerated. Such an ovum has been called bloody mole if fresh blood is present, and fleshy mole if decolorized old blood is present.

In some cases the entire placenta may be retained within the uterus. Bimanual examination shows a large uterus, dilated cervix, and the diagnosis generally made is submucous fibroid or chorioepithelioma. In fact, with very adherent placenta examination by the finger does not always make the differentiation. Such a placenta may be retained in the uterus a year or more, and if it undergoes no putrefactive changes the diagnosis is indeed difficult. More frequent is the retention of decidua which does not undergo involution, but remains as a hypertrophied, hyperplastic lining, giving rise to menorrhagia and repeated abortions.

Most frequent is retention of microscopic fetal cells in the form of villi, or the cells which cover the villi, the cells of Langhans, and the syncytium. The most frequent causes of repeated abortion are syphilis, retroflexion (metritis and fibrosis uteri), and especially "endometritis hyperplastica."

Abortion is most frequent in the third month, when the chorionic villi begin to atrophy except at the serotina, the future placental site. The danger periods in repeated abortions are the omitted menstrual days—the periods when menstruation would have occurred had no pregnancy taken place.

LEUKORRHEA

Leukorrhea represents a discharge of white, yellow, or green, thin, thick, or mucoid secretion originating from the vulva, vagina, cervix, or uterus. This secretion may represent either a hypersecretion or an inflammatory product. A purulent secretion from a urethritis may be accumulated within the folds of the vulva, and may cause, in addition to its own accumulation, a chronic localized inflammation of the inner surface of the labia, of the vestibule, and about the introitus. A purulent involvement of one or both of the glands of Bartholin may cause a more or less constant discharge of pus, to which may be added the secretion resulting from an associated vulvitis. Such a secretion is to be noted in chronic and acute gonorrheal involvement of the vulva and of the ducts and canals which open into the vulva. This condition is most clearly exemplified in the gonorrheal vulvitis of children, with which a vaginitis is almost invariably combined. In the chronic forms of vulvitis not due to the gonococcus there is a reddening of the vulva and the secretion may be rather of a serous nature.

Normal Vaginal Secretion.—The vagina of the newly born is sterile only for two or three hours, after which period bacteria are present. The normal vaginal secretion contains cast-off squamous epithelia and myriads of bacilli. The bacilli present in the normal vaginal secretion are short rods, evident to any one who takes the trouble to examine a specimen under the microscope. These important bacilli are those described by Döderlein, and are held responsible for the acid reaction of the normal vaginal secretion. This acid reaction is credited with a deleterious action on the growth of other bacteria and renders the normal vagina free of pathologic germs, destroying within twenty-four to forty-eight hours any pathologic cocci or germs introduced experimentally into the vagina. The normal vaginal secretion, then, contains desquamated squamous epithelial cells, the bacilli of Döderlein, and many other micro-organisms, and is of a serous, milky character.

Hypersecretion.—A milky serous secretion is characteristic of the vagina. As the normal vaginal secretion contains squamous epithelia alone, it is wrong to consider any vaginal secretion of this nature, even though profuse, as inflammatory. Such a condition is often the result of hypersecretion and is noted with pelvic tumors and with other conditions which cause pelvic congestion. Hence it is particularly marked in pregnancy and in the first few weeks after labor. Hypersecretion may be due also to chlorosis, to anemia, to onanie, and to excessive intercourse. Hypersecretion represents an increase of the normal secretion which is of a milky, serous character. There is often a great accumulation on the surface of the vagina of drier, white particles consisting of cast-off squamous epithelium.

Bacteria in the Vagina.—There has been and is much difference of opinion as to the presence of pathologic bacteria in the vagina, some finding streptococci, staphylococci, in a certain proportion of cases with pathologic secretion, while others deny such findings. It must be remembered that the vulva contains numerous bacteria and cocci of various forms. Menstruation, masturbation, lack of cleanliness, too frequent douching, intercourse, etc., are causes which favor the entrance of these vulvar germs into the vagina. We know that bacteria may be introduced into the vagina by the manipulation of examination. Their growth may be favored by the wearing of pessaries for long periods or by the retention of tampons for too long a time, thus really producing a mild vaginitis. The bacterium coli from the rectum, especially in women with lacerated perineum, and more so in women with tissues of lessened resistance, may find ready entrance into the vagina. Latent gonorrhea in the male is productive of infection of the vagina, cervix, and uterus, not always with the gonococcus, but with the other cocci often present in such chronic prostatic conditions in the male. The blood expelled in menstruation, after abortion, or after labor diminishes the acidity of the vagina and furnishes a medium which furthers the development of any bacteria or cocci which are present and furnishes a factor which favors their upward extension. Therefore it must be said that very often the bacterium coli and numerous bacilli and cocci of saprophytic type, together with

yeasts, are found with pathologic conditions in the vagina, cervix, and uterus. In addition, there may be found gonococci, and also streptococci and staphylococci. The virulence of the later forms differs widely.

Leukorrhea due to Colpitis.—In addition to squamous epithelia, polynuclear leukocytes or pus cells may be present. In some women bacteria and saprophytes of various forms grow in the vagina and produce a mild vaginitis with marked desquamation of squamous epithelia, especially in warm weather. In such cases we note the presence of numerous forms of bacteria. They may be found in such variety and large numbers that they give the picture of a pure culture. The vagina on close examination may show a diffuse reddening or it may be covered with multiple small red granular spots. Other cases show isolated areas of dark red or blue character with a dilatation of fine venous channels. Associated irritation of the external genitalia is sometimes evident to the eye, and is due either to this vaginal factor or to scratching, which causes an added irritative condition. It is necessary to note the cause, and to differentiate the local vulvar changes due to the causal factor from the external changes brought about by scratching or irritating treatment. In many cases no external or internal lesions are evident, the only symptom being a profuse vaginal discharge. Often changes probably have been present, and having run their course only the discharge remains. The Ferguson speculum should be used in noting the character of the vaginal mucosa.

In gonorrheal vaginitis there is a discharge of purulent secretion containing pus cells and gonococci. Primary gonorrheal vaginitis in adults is not frequent, but in children always accompanies a gonorrheal vulvitis. The vaginitis of gonorrheal origin is generally secondary in this sense, namely, that it is caused by the discharge of gonococcus-bearing secretion from the cervix and uterus, which, by constantly bathing the vaginal mucosa, finally causes a vaginitis which is most marked in the posterior fornix and on the posterior wall of the vagina. The vagina may be diffusely red and granular and may show loss of epithelium in certain areas, especially in the posterior fornix. Gonorrheal vaginitis is more intense in pregnant women.

The discharge in every case of leukorrhea should be examined microscopically to determine the forms of bacteria present. In examining vaginal secretions we may find, besides the bacilli of Döderlein, other bacteria. In addition, leukocytes or pus cells may be present. The greater the number of leukocytes, the greater is the inflammatory reaction.

A milky serous discharge is present with mild colpitis. A green or yellowish-green discharge coming from the vaginal wall is gonorrheal. Colpitis is to be diagnosed by the character of the vaginal secretion and by changes in the mucosa. If pus cells are found in the vaginal secretion, admixture of the pus from the cervix or uterus must be excluded by use of the Schultze tampon. Pus cells in the vaginal secretion mean inflammation.

Hypersecretion from the Cervix.—In many women, especially unmarried, there is a profuse hypersecretion of clear tenacious mucus from the cervix. This may result from congestion, from masturbation, or from displacement of the uterus. It is not an abnormal secretion in character. The microscope shows mucus and a few cast-off epithelial cells. A pathologic secretion is white, yellow, or green, and consists of mucus, epithelia, and polynuclear leukocytes or pus cells.

Leukorrhea from Erosions.—Erosions represent a substitution of the squamous epithelium of the vaginal portion of the cervix situated about the external os by cylindrical epithelium of the cervical canal. Erosions are almost invariably due to an associated cervico-uterine catarrh. The erosion itself produces a catarrhal yellow secretion, especially if of the glandular type. Since the erosions are due to cervical or uterine discharge (often gonorrheal), the amount of mucoid secretion discharged from the cervix may be very marked.

Leukorrhea from Endocervicitis.—In the acuter forms of endocervicitis due to gonorrhea the discharge is of a greenish and later of a yellowish character. It consists of pus cells. A typical cervical discharge is always mucoid, but there are cases of gonorrheal involvement of the cervix and uterus in which the cervix does not react by the production of much mucus and yet the lining of the cervix is inflamed and reddened. In such cases it is hard to distinguish between the discharge which comes from the cervix

and that which comes from the uterus. Acute endocervicitis may be followed by some hypertrophy of the cervix, and later on by erosions. In the most frequently observed form of cervical inflammation we have what is known as a chronic endocervicitis, characterized by a discharge of whitish, thick mucus and by hypertrophy. There may be present on the vaginal portion of the cervix the so-called follicles of Naboth, which represent either a dilatation of cervical glands which have grown through the cervix up to the squamous epithelium, or else they represent dilatation of the glands present in an erosion. This condition of chronic cervical catarrh is very frequently associated with an involvement of lymphatic connective tissue situated in the posterior parametrium and in the uterosacral ligaments. This involvement of the post-parametrium is most marked in those cases originally gonorrheal or originally septic after abortion or labor. In this chronic and very frequent form there is often an eversion of the lips of the cervix when they are torn laterally. The everted mucous membrane may be red and swollen and produces much discharge. In chronic endocervicitis we have a catarrh of the cervix due to chronic inflammation and irritation by bacteria of various forms and producing a white or yellow stringy mucoid secretion, often very thick and tenacious, and often forming a plug which may completely fill the dilated cervical canal. A mucoid discharge comes only from the cervix.

Leukorrhea Coming from the Uterus.—Even in puerperal women free of fever a certain small percentage show streptococci, staphylococci, gonococci, and bacteria in the lochia. The relative proportion of the infecting bacteria in puerperal endometritis, according to Krönig, shows 2 per cent. staphylococci, 27 per cent. saprophytes, 27 per cent. gonococci, and 43 per cent. streptococci. The fatal cases are due to streptococci.

It is claimed by some that bacteria are present in chronic hyperplastic endometritis, but Döderlein says that this is not so. Peraire found bacteria in all cases of endometritis and metritis, among them a bacillus and a coccus which in pure culture caused inflammation in the vagina of rabbits and the uteri of dogs. Döderlein says that this is no proof that they would do so in the human being. Brandt in twenty-five cases of endometritis obtained the curetted

particles and found cultures in twenty-two. In one-third of these he got streptococci and staphylococci pyogenes aureus and albus. These Döderlein calls an accidental infection of the media. Pfannenstiel and Menge obtained negative results by tests like Brandt's. Bumm in fifteen cases of endometritis found bacteria by cultures. He says that they are not the cause but are only added factors. Menge in seventy-three uteri examined the fundus in seventy-three and the cervix in twenty-nine, and found only six cases with bacteria. Among these were cervix carcinoma, a submucous myoma, and a case of tuberculosis. The corpus mucosa in seventeen was normal, in twenty-nine was hyperplastic or hypertrophic, in twenty-one inflammatory, that is, there was small-celled infiltration. Examination of the cervix mucosa showed ten normal, ten hyperplastic or hypertrophic, and nine inflamed.

We must distinguish two forms of "endometritis"—a non-inflammatory and an inflammatory. The non-inflammatory represents simply a hyperplasia of the endometrium, *i. e.*, an overgrowth. It is characterized by menorrhagia and discharge is not a symptom. In the inflammatory form we have round-celled inflammatory involvement of the endometrium, sometimes diffuse, more often localized or scattered, sometimes deep, but more often superficial. It is characterized not by menorrhagia but by discharge and by pain.

Uterine leukorrhea means, then, a discharge from the uterine canal of a serous, sero-purulent, or purulent secretion containing epithelia and polynuclear leukocytes or pus cells. It is divided into the forms known as gonorrheal and catarrhal. The gonorrheal form implies the finding of gonococci, yet in many cases where the yellow or green discharge contains nothing but pus cells, the gonococci cannot be found. A discharge containing epithelia and pus cells, and light or white in color, may represent the end-stage of a gonorrheal invasion, or may be due from the beginning to other bacteria.

A white discharge from the uterus, containing epithelia and leukocytes and no gonococci, is known as catarrhal endometritis.

Not every inflammatory condition of the endometrium is characterized by profuse discharge. The secretion cast off from the uterine lining may be slight in amount or even absent, in spite of

well-marked inflammatory changes. A Schultze tampon must be left in place for twenty-four hours, and by its use the uterine discharge is collected, is differentiated from the cervical mucoid discharge, and contamination by vaginal secretion and bacteria is avoided. Fig. 12 and Fig. 13 show the apparatus by which the secretion of the cervix and uterus may be obtained for examination.

In older women there is noted a sero-purulent discharge due to growth of bacterium coli or of saprophytes, and is often associated with the vaginal involvement known as senile vaginitis. Senile vaginitis implies the growth on non-resistant tissues of bacilli or cocci which are normally held in check by resistant epithelium and by the normal acid vaginal secretion. The discharge in senile endometritis may be associated with a disagreeable odor. Carcinoma should always be suspected.

A degenerating fibroid may result in the discharge from a uterus of a disagreeable secretion with foul odor. Beginning carcinoma is characterized by a serosanguineous discharge. Tuberculosis of the endometrium (a rare condition) may produce a purulent secretion. Degenerating carcinoma of the vagina, of the cervix, or of the uterus produces a discharge of typically foul odor. Waiting for such a diagnostic sign means almost invariably an inoperable malignant infiltration and degeneration. Any discharge from the vagina, cervix, or uterus, whatever its color, quantity, or character, in women about forty or after forty, especially if of a foul nature, and more especially if it comes on after a period of climacteric amenorrhea, should be viewed as due to a malignant growth until most thorough investigation proves it to be due to another cause.

In uterine tuberculosis infection may have extended upward as a result of genital tuberculosis in the male, as is proved by cases of exclusive involvement of the cervix. Involvement, however, is most frequently found in the cornua, an evidence of the downward extension of a tubal tuberculosis.

When the cervix is primarily attacked the condition usually remains localized. There are various gradations; large miliary deposits, caseation, necrosis, and extensive destruction. There is a particular form found in which the uterus is thickened and enlarged and fibroid in character.

In the cervix we have (*a*) the ulcerating form; (*b*) the miliary form; (*c*) the papillary form.

In tuberculosis of the uterus the uterine surface may show tubercles; coalesced tubercles; lining thick and pulpy; lining uniformly nodular and tuberculated; irregular, necrotic, and shreddy endometrium; a necrosis involving the muscularis; a degeneration of the body wall; endometrial ulcers; a tuberculous pyometra; localized polypoid growths.

The symptoms are menorrhagia and mucopurulent discharge. The diagnosis is made by the curette and by the existence of other tubercular lesions. Even after hysterectomy, the diagnosis is often only made by the microscope, and the condition is not infrequently mistaken for carcinoma.

TREATMENT OF LEUKORRHEA

When first seen, every case evidencing *vulvitis* should have the vulva thoroughly washed with glycerin-soap and water, making use of cotton sponges. Treatment of the vulvitis demands absolute cleanliness and the correction of the cause. If it is secondary to conditions existing in the urethra, bladder, vagina, cervix, or uterus, these affections must be treated. In addition to the preliminary washing, the vulvitis itself is benefited markedly by warm sitz-baths taken twice daily for a period of fifteen minutes. Shaving of the parts, if the skin area is involved, is of great value. Twice daily a douche should be taken consisting of 1 dram of acetate of aluminum to 2 quarts of water.

Vulvitis associated with fresh gonorrhea should be treated by cleansing of the external structures. Mild solutions of corrosive sublimate, 1 : 5000 to 1 : 10,000, should be used. The parts should be carefully separated and gently sponged with cotton soaked in this solution. Bichlorid gauze should then be placed in such a manner that the two sides of the vulva are well kept apart. A gentle T-binder should be applied. The vulva should be washed in this manner several times daily, each washing being preceded by a vaginal douche of bichlorid of mercury, 1 : 2000. The patient should be kept in bed, laxatives should be administered, and urotropin and salol, 5 grains of each, should be administered four times a day. If the skin is sensitive and red and is irritated

by the action of the bichlorid of mercury, the gauze dressing should be saturated with a ½ per cent. solution of acetate of aluminum. In the subacute stage the vulva should be treated by the silver salts. It should be painted with argyrol 25 per cent., or by nitrate of silver 5 to 10 per cent., and the surfaces should be kept dry by gauze or dusted with dermatol or nosophen.

In *gonorrheal vaginitis* the vagina, if not too sensitive, should be washed with the aid of a Ferguson speculum with sponges soaked in a carbolic solution, and gauze soaked in 1 to 5 per cent. protargol should be introduced into the vagina, especially into the posterior fornix, and left in place for several hours. Still later the vagina should be bathed, with the aid of a Ferguson speculum, by solutions of nitrate of silver 1 per cent., and the vagina should be gently packed with sterile gauze or iodoform gauze left in place for twenty-four hours. Then irrigate daily with alum 2 per cent., or permanganate of potash 1 : 1000. In the chronic persisting forms of gonorrheal vaginitis the Ferguson speculum should be used and nitrate of silver should be applied in stronger solutions. In the acute stages of vaginitis douches should be cool, in the subacute stages tepid, and in the chronic stages warm.

In very chronic cases if silver 1 per cent. or stronger fails, paint the vagina every two or three days with tincture of iodin or silver 5 to 10 per cent., and pack the vagina with iodoform gauze. Continue the treatment till vaginal epithelium desquamates. Douches should then consist of tannic acid, sulphate of zinc, or alum, 1 dram to the quart. Splendid results are to be had by bathing the vagina with the aid of the Ferguson speculum with bichlorid of mercury 1 : 100, rendered acid by a few drops of hydrochloric acid. Then pack with iodoform gauze and repeat twice a week. In the meantime irrigate with 1 : 5000 to 1 : 2000 bichlorid.

In that chronic form known as *colpitis granulosa*, first clean the vagina with the aid of the Ferguson speculum, and then use pure pyroligneous acid in the Ferguson speculum, rubbing it well into the vaginal mucosa with cotton on a swab. This should be done two or three times a week.

Senile Vaginitis.—Bathe the vaginal walls thoroughly with pyroligneous acid three times a week for several weeks through the Ferguson speculum. Daily douches of pyroligneous acid

3 to 5 drams to the quart are to be given. No pessary is to be worn.

For colpitis mycotica 1 per cent. corrosive sublimate or 3 per cent. carbolic should be applied with the aid of the Ferguson speculum.

Leukorrhea of Virgins.—In the treatment of vaginal hypersecretion in young virgins cure of the chlorosis often corrects the fluor. If correction of the chlorosis does not cure the fluor, cool sitz-baths increase the tone of the capillaries. If bacteria have developed on the basis of this condition, astringent vaginal irrigations are necessary. *Arsenic and iron are of value.* The catarrhal conditions occurring with chlorosis, anemia, and run-down conditions are due to anemia and to transudation prompted by the hydremic state of the blood. If venous stasis is present in the pelvic organs, a vaginitis may occur, and does so not rarely in obese girls. For the relief of this condition saline waters internally should be used to act on the intestines and Nauheim baths should be given.

DOUCHES IN VAGINITIS.

℞. Acidi tannici..... ℥iss
Zinci sulph..... ℥iss
S.—℥ij to quart.

℞. Acidi pyrolign..... ℥iv
Two tablespoons in quart of water.

℞. Pulv. aluminii acetatis..... ℥ij
℥j to quart.

℞. Acidi tannic..... ℥ij
Glycerini..... ℥vj
One or two tablespoons to quart.

℞. Acidi borici..... ℥j
Pulv. alum..... ℥j
Zinci sulph..... ℥j
℥ij to quart.

Many cases of *chronic vaginitis* show almost no local changes, aside from hyperemia, but are characterized by a more or less profuse leukorrhea. The following is a fair routine treatment for the average case. A Ferguson speculum should be used, for it is the only means of furnishing us with a distinct view throughout the length of the vaginal canal. The vagina is washed thoroughly with cotton in sponges soaked in a 1 per cent. solution of lysol. Then there is poured into the speculum pure pyroligneous acid or

a 1 per cent. solution of bichlorid of mercury rendered acid by the addition of a few drops of hydrochloric acid. By moving the speculum forward slowly the entire vaginal canal is bathed for one minute, and then dried by cotton.

As a rule, vaginitis is best treated by the dry method after the Ferguson bath. This is accomplished by introducing through the speculum dermatol powder with the powder-blower or tannoform, or by introducing a long tubular tampon dusted with dermatol or with tannoform and talc equal parts, or with alum and boracic acid in the proportions of 1 of alum to 1 of boracic acid down to 1 of alum to 4 of boracic acid, the tampon being left in place for twenty-four hours. Alum has a mild corrosive action.

When a decided astringent effect is desired and glycerin is to be used, boroglycerin may be substituted by ichthyol-glycerin (5 per cent.) or by tannic acid and glycerin (2 to 5 per cent.). The vagina at the end of twenty-four hours should be irrigated by one or two daily douches. Boracic acid, 2 drams to the quart, forms simply a mild cleansing douche, while acetate of aluminum, 1 to 2 drams to the quart, is soothing and healing. In the douches, tannic acid, 2 drams to the quart, is an astringent of value with excessive secretion. Alum, 1 dram or 2 drams to the quart, also has an astringent action. Carbolic acid 1 dram to the quart, bichlorid 1 : 5000 to 1 : 1000, creolin, lysol, etc., are cleansing antiseptics. Pyroligneous acid, one tablespoon to the quart, is very good, but the odor is rather annoying.

Another method of treatment by the aid of the Ferguson speculum is a thorough washing of the vagina by any mild antiseptic solution with the aid of cotton in a sponge-holder. The vagina is then dried and the entire canal is then given a Ferguson bath with pyroligneous acid or with tincture of iodin, or with a 1 per cent. silver solution, care being taken not to let any of the fluid flow out over any of the external structures. The vagina is then dried and an ounce of boroglycerin is poured in through the speculum and the vagina is packed with gauze. The glycerin exerts its action on the cervical lining, and in the course of time clears it of its mucous catarrh.

The various preparations mentioned above are to be used as douches. The gauze tampon or the gauze packing is always removed by the patient after twenty-four hours.

This treatment should be repeated two or three times a week, care being taken to avoid irritation of the mucosa, especially when using corrosive sublimate.

Patience is needed in the treatment of *cervical erosions* and *cervical catarrh*, as their cure not infrequently takes several months. It is not sufficient to make local applications to the external surface of the cervix. The associated cervical catarrh must be treated and cured. The best form of treatment is the application of pure carbolic acid by cotton applicator to the entire erosion area. The application is allowed to remain for only a few seconds if the erosions are superficial, but if the erosion is papillary or glandular, the carbolic acid must be allowed to act longer, the idea being to destroy the ciliated epithelium which is growing in the area normally covered by squamous epithelium. Pure tincture of iodin is then applied to the entire cervical covering and to the vault of the vagina. The alcohol in the iodin tincture neutralizes the further action of the carbolic acid and the iodin is applied for its alterative and antiseptic properties. An ounce or more of boroglycerin is then poured into the vagina and the vagina is packed with gauze, which is thoroughly packed into the fornices. The gauze is removed at the end of twenty-four hours and vaginal douches are given twice daily consisting of 3 to 4 tablespoons of pyroligneous acid in 2 quarts of water, or any of the above-mentioned powders. The applications to the cervix of iodin are made three times a week, the carbolic acid being applied once or twice a week, according to the degree to which the ciliated epithelium has been destroyed. Unless the ciliated epithelium is entirely destroyed (and not too deeply at any one time in order to avoid much loss of tissue) the erosion will not heal. When healing takes place, the squamous epithelium is seen to gradually grow in from the edges. In the later stages its growth may be stimulated by the local application of nitrate of silver from 1 per cent. up to 5 per cent. It may be done once or twice a week. The purpose of the boroglycerin treatment is to draw out the cervical mucus and to draw out the cervical inflammation from the very depths of the glandular recesses. When the canal becomes clearer and the mucus becomes colorless, the lining of the cervix may be gently painted with tincture of iodin or with 1 per cent. nitrate of silver. The intracervical

application of electricity, negative pole, 10 M. A., ten minutes, is of great value, repeated three times a week.

In the treatment of erosions stubborn cases must be painted with 50 per cent. solution of chlorid of zinc. In other cases the erosion must be painted with pure pyroligneous acid or with pure formalin, followed by the boroglycerin treatment. Dickinson has made the observation that carbolic acid or iodin do not act well in certain cases with a tendency to eczema, the use of these applications to the cervix having the effect of bringing out eczematous evidences in the skin. Here pyroligneous acid should be substituted. By some the cervical canal in stubborn cases is gently cleared of its mucus and is painted with 10 per cent. silver or with 10 per cent. solution of chlorid of zinc. In my experience the avoiding of intracervical treatment is followed by good healing results and no induration, inflammation, or stricture of the canal takes place.

If follicles are present, they should be opened, the mucus squeezed out, and the little recess should then be touched with carbolic acid followed by iodin.

A distinction must be always made between *erosions and ectropion*, for ectropion does not yield to this treatment. Ectropion simply represents the everted mucous membrane of the cervix, when deep lateral tears are present. Hence ectropion is found only in women who have borne children, while erosions are present in nulliparæ or multiparæ, most frequently in the former. In cases with marked ectropion or in erosions of the cervix associated with diffuse hypertrophy, especially where the cervix is filled with dilated follicles, high amputation of the cervix gives an immediate and satisfactory result.

The treatment of *acute gonorrheal endometritis* means rest in bed until temperature is normal for three weeks; the bowels should be kept open. The diet should be fluid and ice-bags should be applied to the abdomen. For the pain an opium suppository should be used. Hot vaginal douches of bichlorid of mercury 1:5000 should be given three times daily. Dry bichlorid gauze should be applied to the vulva and the parts should be kept separated.

In treating *cervical gonorrhea* Bumm makes incisions in the external os, if it is narrow. When the incisions are healed, he clears the cervix of mucus and applies 1 to 5 per cent. silver nitrate

at one sitting, until the whole lining becomes white. Ichthyol 5 to 10 per cent. is then applied on cotton or gauze. When the resulting membrane finally comes away, he repeats the cauterization with silver or with chlorid of zinc, and ofttimes the case gets well. If it does not heal, or if there are signs of endometritis, he treats the uterus carefully, unless the adnexa have been recently affected. If this is the case, he lets even the cervix alone, for care should be taken to avoid extension to the tubes.

He begins intrauterine therapy, even with women who have had children, with dilatation of the internal os by laminaria in order to get good drainage. Then he swabs out the secretion and applies 1 per cent. silver or 1 to 3 per cent. ichthyol with Playfair sounds covered with cotton. He makes the applications for ten minutes. Injections with a syringe are not advisable. He also uses daily irrigations with a double-running catheter for fifteen minutes to wash out all the folds of the endometrium. He uses silver 1 : 1000 or ichthyol 1 : 100. Sometimes the cocci disappear very soon, but sometimes they reappear after treatment is stopped, in which event treatment must be continued for weeks.

When there is a chronic uterine gonorrhea with many squamous epithelia in the secretion and cocci in groups on the epithelia, stronger solutions must be used, such as tincture of iodin, silver 10 to 20 per cent., or strong chlorid of zinc. The resulting strong reactions after such a thorough cauterization, which should be done only once a week, throw off the cocci. If fever occurs on the day of treatment, or if there is increased sensitiveness of the uterus, treatment should be stopped for a while (Bumm).

In *chronic inflammatory endometritis* intrauterine treatment is capable of very great harm. I do not follow Bumm's method.

A *catarrhal endometritis* not associated with hemorrhage should not be curetted. The treatment is the same as that of cervical catarrh. An important aid is the use of glycerin in the vagina, best applied with the aid of gauze. A very good procedure consists of the use of douches of several quarts of cold water, beginning first with tepid water and gradually cooling it down in the course of weeks. When continued for weeks, it has a hardening effect. This treatment is far safer than dilatation of the cervix with Hegar dilators or with Weir's sounds, and irrigation with 1 per cent.

lysol, 1 to 2 per cent. carbolic, 1 : 3000 sublimate, or ½ ounce of Lugol's solution to the quart of water. These irrigations are done two or three times a week. Later on, with a wide cervical canal the uterus is irrigated and tincture of iodin or 5 to 10 per cent. chlorid of zinc is applied. In other instances medicated sticks containing iodoform or protargol are introduced into the uterus two or three times a week. In other cases steam has been used with fair results. In the treatment of chronic and subacute gonorrhea, although some dilate the cervix and make use of the above methods, it is wiser to use no intrauterine treatment. Every stubborn uterine catarrh which resists treatment is probably gonorrheal. We then depend on the use of the cold douche cure, the use of boroglycerin and gauze, the administration of sitz-baths, suction (Fig. 13), the use of tonics, and such an arrangement of the patient's life as will increase her physical resistance.

In gonorrhea in pregnancy there should be no treatment, except perhaps douches, and the patient should stay in bed four to five weeks after labor, until complete involution takes place.

Senile endometritis demands treatment of the associated vaginitis. This is accomplished by washing the vagina three times a week with pure pyroligneous acid applied through the Ferguson speculum. Douches consisting of 1 tablespoonful of pyroligneous acid to the quart of water should be taken once or twice daily. For the endometritis itself intrauterine irrigations of 1 per cent. carbolic acid are the best. The uterus must be hardened or made resistant to the action of the bacteria. This is best accomplished by the use of tepid water, and later on cold water, in the employment of the vaginal douches, the temperature being gradually diminished in the course of a few weeks. The douches should be copious and consist of several quarts.

In all cases of catarrhal secretion from the uterus associated with descent of the uterus or with retrodisplacement, especially if the uterus is large, a pessary should be eventually introduced. In addition, pelvic congestion should be corrected by sitz-baths, Nauheim baths, and the use of the sinusoidal current applied to the abdomen. Constipation should be corrected by the mechanical methods mentioned in the section on Constipation, for all these procedures diminish pelvic congestion and stasis and aid in

establishing a better general circulation. The use of the pessary is, of course, contraindicated with periuterine inflammation.

In this condition especially, and in all intrauterine discharge, whether of a serous or a serosanguineous or purulent nature, and most especially if the discharge has a fetid character, the existence of carcinoma must be considered. Carcinoma of the uterus may remain for months, and even years, more or less localized to the uterus and with very late extension into the connective tissue of the broad ligament. In the early stages especially enlargement of the uterus is not present. The diagnosis can be made by uterine scrapings, repeated if the symptoms persist and if hemorrhage continues or becomes worse.

PRURITUS VULVÆ

Pruritus vulvæ is generally known as an affection of the external genitalia, characterized by the sensation of burning and itching and biting. The itching is only a symptom of a diseased general or local state. It has been commonly divided and classified, according to the cause, into a constitutional, a nervous, and a local form. Constitutional forms are due to icterus, diabetes, gout, or intestinal toxemia. The pruritus vulvæ due to a general condition such as icterus is only part of a general pruritus and evidences no local change, but when due to diabetes is generally characterized by a typical local alteration of color and character and by local annoyances.

The changes in the character and color of the labia and vulva are so typical in the pruritus associated with *diabetes* that when well marked they cannot be mistaken. The entire skin or mucous covering of the larger and especially of the smaller labia and the clitoris has a thickened, shiny, leathery, glazed look. There is a suggestion of solid edema, but the bronze or copper color is characteristic. Occasionally there is only furunculosis.

In the vulva as well as in other parts of the body errors in metabolism and gouty or other diatheses may be at the bottom of various eczematous skin changes. A local eczematous change may produce redness and swelling of the labia majora, minora, and vestibule, and may extend out to the groins. In the moist form the parts are agglutinated; in the dry form they are not.

The *nervous form* of pruritus, if local, is due to involvement of the nerve-ends in the vulva, but is without evidence of primary local inflammation or alteration, and represents changes in the nerve-ends like those that occur in neuralgia. According to Webster, there is a fibrosis of the nerve-ends.

Aside from this fibrosis of the nerve-ends, local forms of pruritus are due to irritations, to vulvitis or vaginitis, to cervical catarrh, to uterine discharge, and to skin affections.

Pruritus may result from *masturbation.* Onanie may affect the sebaceous glands on the inner surface of the small labia and in the vestibule. There is often evidenced a lengthening of the labia and clitoris, and also a granular uneven character of the surface of the small labia and the vestibule. The vestibule may be greatly congested. The itching ceases only when masturbation is stopped.

Local uncleanliness, perspiration, or contact of the parts may cause an intertrigo or sore condition of the skin. A *dermatitis,* especially in fat women, may be present on the inner surface of the thighs and may spread to the vulva. An acute dermatitis is produced by chemical or other irritation acting on the skin, and improves on removal of the cause.

Intertrigo is characterized by its occurrence at points of contact of skin surfaces. There is at first a marked secretion from the skin glands and a maceration of the epidermis. Then the skin becomes dark red, moist, warm, and sensitive. There is no sign of inflammation. There are heat and pain. On this basis an eczema readily develops.

Eczema is a chronic, itching, desquamating skin affection which is either moist (serofibrinous exudation) or dry (growth of epidermis or fatty secretion).

The irritation of *abnormal urine,* especially urine containing bacteria, or ammoniacal urine, may cause itching. In reviewing the history of numerous cases, especially but not always the milder forms of pruritus vulvæ, it is noted that patients mention a frequency of urination by day and by night. Close examination often discloses the fact that urinary annoyances and vaginal discharge were noted at the same time. This concomitant bladder condition, known as irritable bladder, must be distinguished clinically from the severer forms known as cystitis. That certain forms of profound cystitis cause a most decided vulvitis and pruritus is no novel statement. The connection between urinary disturbances of a milder character and the milder forms of pruritus is evidenced by the result of treatment, and this form furnishes us with a most gratifying percentage of cures. Now that we consider irritable bladder likewise due to a local pathologic condition, we must credit the urine and its contained bacteria with the power of producing external local vulvar irritations.

There are cases in which the *rectum* is perhaps the causal influence, for it is quite certain that after constipation, especially on the use of enemata, or after diarrhea, the means of infecting certain areas of the genital tract are present. This is often the case in older patients with lacerated perineum and in those careless as to personal cleanliness. This factor plays a part in infecting the bladder.

Pruritus is generally present with acute gonorrheal vulvitis. It is often present with other forms of *vulvitis*. It will be found that marked lesions are sometimes present and often absent. There may be diffuse reddening of the external genitalia. The smaller labia may evidence a hypersecretion of the sebaceous follicles or there may be a minute granular roughening or smaller or larger lesions resembling herpes or pemphigus. In chronic vulvitis changes may take place in the papillary bodies and produce evident alterations in the fossa navicularis, in the hymen, or about the urethra.

Local alteration is present in the pruritus so often found in the climacterium, which is experienced as a burning and itching, especially annoying at night. There is in particular a local change which affects the smaller and the larger labia and the clitoris. This typical form associated with visible alterations is known as a *vulvitis pruriginosa*. Pruritus is also a symptom of the rare local atrophic condition known as kraurosis vulvæ.

In *kraurosis* there is an atrophic condition of the corium of the larger and smaller labia and of the introitus. There are seen white spots on the surface, which later takes on a sclerotic character. The mucous membrane becomes gray, white and atrophic, and the smaller labia and the clitoris shrink. The larger labia appear flat and the smaller labia seem almost absent. Narrowing of the introitus results.

Kraurosis vulvæ differs from vulvitis pruriginosa in two respects: (1) There is a decided narrowing of the introitus; (2) the atrophic condition of the skin is marked. In vulvitis pruriginosa the skin is not atrophic, but is folded and red or bluish in color.

Pruritus vulvæ is often secondary to irritation produced in the *vagina* by the gonococcus, the leptothrix vaginalis, the oidium albicans, by the bacterium coli, etc. Inflammation of the vagina

in the early stages shows a red vagina, red papillæ, and discharge. A frequent form of pruritus vulvæ, then, is that due to vaginal non-gonorrheal leukorrhea of the nature of hypersecretion or of an inflammatory character. In younger women acute vaginitis is in almost all cases gonorrheal in etiology. When pruritus is present with an acute gonorrheal affection, it is of little importance in making the diagnosis, for other conditions attract the greatest attention. When, however, the acuteness of the condition has passed, isolated remains of the local alterations are of corroborative value. A purulent urethritis, spotted areas of redness on the vulva, infection of the glands of Bartholin, the flea-bite redness about the opening of the ducts of Bartholin, red eroded areas in the fourchet, small red papillary areas in the vagina, and inflammatory involvement of the cervix all speak for the gonorrheal nature. After the acute condition is gone, such evidences may be entirely absent, however, below the cervix, and yet pruritus is present.

We must also distinguish and bring into a separate class the *senile form of vaginitis*, in which there is often a diffuse, red, irritative or non-ulcerative condition due to the growth of bacteria on senile tissues of lessened resistance. The bacteria producing such conditions do not, as a rule, produce these irritations in younger women with more resistance epithelium. The bacteria coli, together with yeasts, are probably important factors in the production of this senile condition of which pruritus is a symptom. The wearing of rings to relieve prolapse or cystocele always increases the vaginal irritation and increases the pruritus.

Pruritus may be the result of a discharge coming from the *cervix or uterus*. Catarrh of the cervix or uterus may produce a secretion of an exceedingly irritative nature. With an originally subacute involvement of the cervix, local objective vaginal and vulvar signs are generally absent, and pruritus in a certain number of cases may be the only symptom, and the discharge the only objective evidence.

Another cause of leukorrhea and pruritus, but itself probably due to bacterial influence, is erosion of the cervix, which is always associated with an endocervicitis.

Uterine leukorrhea due to catarrhal or gonorrheal endometritis, and the secretions resulting from a degenerating fibroma or from

a carcinoma of the cervix or uterus or associated with senile endometritis, are capable of causing pruritus vulvæ or vulvitis.

In pregnancy an increased vaginal secretion containing bacteria of various forms is productive of vulvar itching and burning.

TREATMENT OF PRURITUS

Pruritus due to pediculi should be treated by a shaving of the parts and by the application of blue ointment or gauze soaked in 1 : 1000 corrosive sublimate.

If the pruritus takes its origin from the rectum, cleanliness is essential, and the anal area should be thoroughly washed. After a thorough use of soapsuds, a 1 per cent. carbolic salve should be applied about the anal area.

In the pruritus secondary to bladder involvement, and so associated with frequency of urination, the bladder should be washed with boracic solution followed by the injection of several ounces of a 1 per cent. solution of ichthyol, which the patient is to retain as long as possible. With more marked involvement of the bladder, the bladder should be washed with boracic solution and then anesthetized with an ounce of 1 per cent. solution of eucain or a 4 per cent. solution of antipyrin. Four or five ounces of a 1 : 1000 nitrate of silver solution should then be injected into the bladder and allowed to remain for two minutes. This treatment should be carried out twice a week. Internally, urotropin, 5 grains, salol, 5 grains, should be taken freely.

Many cases of pruritus are due to a vaginitis manifested by a more or less profuse leukorrhea. A Ferguson speculum should be used, for it is the only means of furnishing us with a distinct view throughout the length of the vaginal canal. The vagina is washed thoroughly with cotton sponges soaked in a 1 per cent. solution of lysol. Then there is poured into the speculum a 1 per cent. solution of bichlorid of mercury, rendered acid by the addition of a few drops of hydrochloric acid, or else pyroligneous acid or tincture of iodin are poured in. By moving the speculum forward slowly, the entire vaginal canal is bathed for one minute and then dried by cotton. A long tampon is then introduced, made and prepared as follows: absorbent cotton is

rolled to a thickness approaching the diameter of the speculum and 4 to 5 inches in length. This is covered with a double layer of sterilized gauze and fastened at either end by a string tied about it, one of the strings left long for the purpose of removing the tampon. The gauze is dusted thoroughly on all sides with a powder composed of 1 part alum and 4 parts boracic acid, the proportion of alum being increased when a more decided desiccation and desquamation of the vaginal lining is desired. This tampon is introduced through the speculum and kept in place for twenty-four hours. In this manner the application is made equally to all parts of the vagina, and the secretion is so absorbed that on removal of the tampon the vagina is found to be dry. When the tampon is removed at the end of twenty-four hours a douche of one tablespoonful of formalin to the quart of water, twice a day, is given. In my experience better results are often gained without douches of any sort. Draining the vagina and keeping it dry are of decided value. It is often astonishing how rapidly a pruritus and a leukorrhea disappear after this treatment. Involvements of the cervix and uterus demand the treatment mentioned under Leukorrhea.

Local applications are used for the purpose of healing any evident alterations and for the purpose of diminishing the sensitiveness of the nerve-ends. Watery solutions include 2 to 5 per cent. carbolic, dilute acetate of lead, 1 to 20 per cent. nitrate of silver. Salves include a 10 per cent. calomel ointment; 5 to 10 per cent. cocain salve (cocain 1 dram, lanolin 1 ounce, olive oil 2 drams); or menthol ointment (menthol ½ dram, olive oil 2 drams, lanolin 1 ounce); a carbolic ointment, containing 15 grains of carbolic acid, to 1 ounce of unguentum zinci oxidi; a 10 per cent. ointment of anesthesin.

For pruritus without external alterations:

℞. Cocain..... ℥j
Ol. oliv..... ℥ij
Lanolin..... ℥j
M. S.—External use.

℞. Menthol..... ℥ss
Ol. oliv..... ℥ij
Lanolin..... ℥j
M. S.—External use.

℞. Acidi carbolici..... gr. xv
Ung. zinci oxidi..... ℥j
M. S.—For external use.

Intertrigo demands the following (Unna):

℞. Zinci oxidi..... ℥iiiss
Sulph. præcip..... ℥iiss
Mag. silicat..... ℥j
Ol. paraffin alb..... ℥iij
Adip. benzoinat..... ℥ij
M. f. past.
S.—External use.

To this 5 per cent. of ichthyol may be added if pustules are present:

℞. Calc. carb. præcip..... ℥v
Zinci oxidi..... ℥v
Ol. lini..... ℥j
Aq. calcis..... ℥j
M. f. past.
S.—External use.

Simple eczema, characterized by a red, rough, dry epidermis, demands the use of zinc oxid ointment, to which may be added 5 per cent. of ichthyol or 2 per cent. of resorcin. If the eczema is of a papulovesicular type (Unna):

℞. Resorcin..... ℥j
Ichthyol..... ℥j
Acidi salicylici..... gr. xx
Vaselini..... ℥iiss
M. f. unguent.
S.—External use.

If the eczema is of a horny, callous nature through scratching and mechanical irritation of a simple eczema (as may happen on the large labia), or for any itching or pain (Unna):

℞. Ammonii sulphoichthyoli (Thigenol)..... gr. xxx
Aquæ..... ℥iiss
Glycerini..... ℥iiss
Dextrini..... ℥iiss
M. f. past.

Or:

℞. Ung. diachylon (Hebra)..... ℥j
Vaselini..... ℥ij
Liantral..... gr. xv
Ext. cannabis indic..... gr. xv
M. f. unguent.
S.—External use.

Because of the eczematous nature of many of the simple cases, the following paste is of value. It consists of salicylic acid 15 grains, amylum 5 drams, oxid of zinc 6 drams and of vaselin and lanolin an ounce and a half.

℞. Acidi salicylici..... gr. xv
Amyli..... ℥v
Zinci oxidi..... ℥vj
Lanolini..... ℥vj
Petrolati..... ℥vj
M. S.—For external use.

It is in these conditions of intertrigo and eczema that the parts should be kept as free as possible of water and cleansing should be done with olive oil. If a moist sponge be used first, it should be followed by a cleansing with olive oil. If salves fail, a dusting-powder should be used. A good one consists of menthol 15 grains, salicylic acid ½ dram, oxid of zinc 2 drams, amylum and talcum 5 drams. Stubborn cases demand the aid of a dermatologist, for a thorough desquamation of the horny layer must be caused by a strong resorcin paste, followed by subsequent treatment of a special nature.

℞. Menthol..... gr. xv
Acidi salicyl..... ʒss
Zinci oxidi..... ʒij
Amyli..... ʒiiss
Talci..... ʒiiss
M. S.—Externally as dusting-powder.

℞. Acidi carbolici..... gr. xxx
Calomel..... ʒj
Pix liquida..... ʒiss
Menthol..... gr. xx
Zinci oxidi..... ʒij
Lanolin..... ʒij
S.—Rub actively into the skin twice daily after bathing with hot water.

Attention should be paid to the diet. Autointoxication should be prevented; tea, coffee, alcohol, and opium should be prohibited. Internally Fowler's solution and the compound syrup of hypophosphites should be administered.

John J. Reid advises the use of pilocarpin for its specific effect in different forms of pruritus. The ordinary dose is one-quarter of a grain, to be given only when the itching manifests itself, and not to be repeated until the itching returns. It is well to begin with one-eighth of a grain, owing to individual susceptibility. The addition of $\frac{1}{100}$ grain of atropin prevents sweating. The pilocarpin is given by mouth.

In the *diabetic* form the routine treatment of diabetes should be carried out. Codein, aside from its action on the diabetes, diminishes the itching. Rudisch has found that the methyl hydrobromid of atropin in the total amount of $\frac{1}{10}$ to $\frac{1}{8}$ of a grain divided during the day, with or without codein phosphate 1 grain or more per day, is the best internal medication for diabetes. Douches should be taken, twice daily, of a dram of acetate of aluminum to 2 quarts

of water. The vulva should be washed thoroughly with soap and water and then washed well with normal saline solution. It should then be thoroughly washed with a 1 : 5000 bichlorid solution and carefully dried. With a Ferguson speculum the vagina should be bathed with a 1 per cent. nitrate of silver solution. The area of the vulva within the external labia should be painted with silver nitrate 1 per cent. Then a bismuth-oxid-of-zinc ointment should be applied. The patient should apply this ointment several times a day. Office treatment should be carried out twice a week.

The ointment to be applied contains 1 dram of bismuth subnitrate to an ounce of oxid of zinc ointment.

Kraurosis.—The vulva should be shaved and thoroughly cleansed with soap and water and painted with tincture of iodin once a week. Compresses of 5 per cent. creolin should be used.

Cases not relieved by treatment demand surgical removal of the affected area.

PAIN

VAGINISMUS

Vaginismus is a reflex cramp or spastic contraction of the constrictor cunni alone, often also of the levator ani and transversus perinei, or of all the muscles of the pelvic floor, which is caused by the attempt at or by the actual beginning of coitus and which prevents coitus. It may be due to unusual sensitiveness of the vulva or to actual lesions of the hymen and vulva produced by coitus, and which make renewed attempts immediately after marriage painful. It is a condition acquired also as the result of infections which cause vulvitis or breaks in the tissues and fissures. In some cases a very narrow vulva, or, as Sims pointed out, an abnormally high or low position of the vulva, is indirectly responsible for vaginismus.

In addition to the spastic contraction of the muscles reflexly produced from the sensitive or irritated structures of the vulva, the same condition is caused by the mental condition and attitude of the patient, and is associated with contraction of the adductors of the thighs. There is in many of these cases a psychic anxiety, especially after previous unsuccessful or painful attempts at coitus. Nervousness on the part of the male, and inability to overcome the nervousness on the part of the female, with resulting fruitless attempts at penetration, plus early emission, increase the nervous tendency and result not infrequently in the production of an acquired neurosis in the female and also in the male. Often this condition is of considerable importance. This element is not infrequently noted in nervous, hysterical, hypersensitive, and sexually modest women, and, as Veit says, is rarely observed among the lower classes.

Treatment.—Treatment consists in ordering freedom from coitus until the patient becomes quieter. The nerves should be treated by rest, bromids, and the glycerophosphates of lime and soda. Attention should be paid to the treatment of local altera-

tions. Examination in these cases is often difficult and must sometimes be done under anesthesia. Gentleness in some cases and sternness in others generally permits, however, of examination, which is essential in determining whether we are dealing with a rigid hymen, an unusually sensitive hymen, with visible lesions of the vulva, etc., or whether we are dealing with spastic contractions due to and associated with a state of nervousness and psychic anxiety. In some cases it is necessary to excise the hymen. In other cases the method of Sims and Dührssen is used, for the purpose of making two lateral incisions, partially or completely separating the constrictor cunni. This is followed by gradual dilatation, done with the fingers or with large glass plugs left in place for an hour. This gradual dilatation, using constantly larger tubular specula, should be done with the preliminary use of cocain ointment to avoid pain. Avoidance of pain in the treatment of these cases is very important to allay the anxiety and fear associated with the thought of any approach to the vulvar area.

DYSPAREUNIA

Dyspareunia means pain accompanying coitus. This may be due to inflammatory conditions in the urethra, the presence of urethral caruncles, the existence of an acute or chronic vulvitis. It may be due to a vaginitis. More frequently, however, the cause is located higher up, and is to be sought in an inflammation or infiltration of the connective tissue of the pelvis or an involvement of the peritoneally covered organs. A parametritis, either lateral or posterior, is not infrequently productive of pain on coitus. The most frequent causes, however, are peritoneal adhesions associated with a salpingitis or pyosalpinx, with a perioöphoritis or with fixed retroflexion. It is naturally to be expected that congestion and the pressure on the pelvic viscera produced by coitus, and which therefore exerts a tugging effect on adhesions, will be productive of pain. Dyspareunia in the strict sense is an acquired condition, coming on weeks or months after marriage, or after labor or childbirth, and in this time element differs, so far as the vulvar causes are concerned, from vaginismus.

COCCYGODYNIA

Coccygodynia implies an alteration in the coccyx or its periosteal covering, or in the muscles and fascia connected with it, as a result of which pain occurs whenever tension or pressure on the coccyx or its attached structures takes place. This condition may occur as the result of a fall or kick which produces a fracture or dislocation of the bone.

According to Grandin, caries of the bone is a very frequent cause. In many cases the condition appears to be due to a localized rheumatic or gouty condition. In some of the cases the pressure effects of labor, especially if associated with the use of forceps, may have been the cause. In many instances the cause must be referred to those inflammatory chronic diseases of the cervix and uterus with which a progressive cellulitis is associated. There is pain felt on sitting, and on the muscular contraction associated with rising from a sitting position or with the pressure exerted on defecation. On examination through the vagina or through the rectum, pressure on the tip of the coccyx and on the muscles attached to it produces pain. Pressure exerted on the posterior surface of the lower end of the sacrum and the tip of the coccyx is productive of pain. The coccyx may be felt in some cases to be bent at right angles. In other instances coccygodynia is part of a general nervous or neurasthenic state.

Treatment.—Severe cases, which are sensitive to pressure, as a rule, are cured only by subperiosteal resection of the coccyx, with or without separation of the muscles attached to the lateral periosteal covering of the coccyx. In other less severe instances, tonic treatment, antirheumatic treatment, and medication and diet looking to the correction of a gouty diathesis are of value. Bromids, the coal-tar products, and codein are of aid in relieving pain. Hydrotherapy is of value for a general tonic effect. In all cases evidencing cervical or uterine discharge, gauze and glycerin treatment per vaginam should be used.

SIGNIFICANCE OF PELVIC PAIN

The pain from which women may suffer may be acute when it occurs for the first time; it may be of repeated acute nature; it

may be continuous or steadily progressive, or it may be associated only with the menstrual period.

In the first class we have ectopic gestation, ovarian tumors with twisted pedicle, etc., acute inflammatory involvement of the uterus, tubes, and peritoneum, and appendicitis. The two latter, when acute in their character, are associated with pain, abdominal tenderness and rigidity, and other evidences of localized or general peritonitis.

Ectopic Gestation.—The two symptoms of greatest value are (*a*) atypical menstruation, or metrorrhagia, (*b*) pain.

The pain of ectopic gestation in the early weeks is an indefinite pain, felt on one side or in the pelvis, which later on begins to assume a colicky nature. This colicky pain is an evidence that there is bleeding into the tube or into the peritoneum.

The colicky sharp pains of ectopic gestation are generally closely attended by the appearance of a bloody discharge from the vagina. If the colics are very severe, with steady pains between them, the abdominal walls may be rigid. The colics in the beginning of tubal pregnancy are often mistaken for intestinal pains. They may not cause the patient to rest more than momentarily from her work or pleasure. In other cases the pains are so severe and agonizing that a physician is at once sent for, whatever the time of day or night. Soreness of the abdomen may pass off in an hour or less after a severe ectopic gestation colic, or it may be so prolonged as to prevent the patient from walking for a day or two, or longer. Occasionally jars of the body in walking, or being much upon the feet, cause so much pain that the patient remains in bed for a while. In such cases the colics may return after shorter or longer intervals.

If the patient has been accustomed to painful menstruation, we should analyze the character of her dysmenorrhea, and ask her particularly if the pains which appear in connection with the blood at this time are the same as the usual pains of her dysmenorrhea. If the patient is intelligent, she will at once say that she never had pains like these, and she will at once state wherein the pains and the flow of her present attack differ from her previous and painful menstruations. If with a diagnosis of miscarriage the patient is

still bleeding and has pains, we should be slow to accept such statement, unless a fetus has actually been seen by some one.

The diagnosis is made from the history, from general symptoms, from atypical bleeding, by bimanual examination.

A pregnant tube is always tender when squeezed, and may be extremely painful when so treated. Examination per rectum discloses an enlarged, painful, sensitive tube. The tube may be embedded in blood-clots, or so displaced, or partly or completely engulfed in hematocele, that its form and size are indistinguishable. Morning sickness and enlargement of the breast, which are the ordinary symptoms of intrauterine pregnancy, do not belong to the symptomatology of the extrauterine pregnancy.

Tubal rupture is sometimes associated with a very sharp agonizing pain, felt in one side and associated with the symptoms of internal hemorrhage. Mild or severe attacks of pain when tubal abortion or rupture takes place are associated with rapid pulse, pallor, attacks of fainting and syncope, absence of temperature or subnormal temperature. There is, however, in some cases an associated rise of temperature to 100° or 101° F., and even as high as 103° F., due to the absorption of the fibrin elements of the blood. The pain in tubal abortion or tubal rupture is sometimes of a diffuse nature, and sometimes is felt so high up in the abdomen as to simulate an affection of the gall-bladder.

The tragic stage of the disease is exemplified by severe colics, pallor of the skin, weak and rapid pulse, a fall of temperature one, two, or three degrees below normal, rapid breathing, fainting, generally vomiting and restlessness, and sometimes a lethargic condition from which the patient may be aroused. In this tragic stage the pulse may be anywhere from 120 to 180. It may not be possible to count it at the wrist, although its flickerings may be perceived until shortly before death (Harris).

Ovarian Cyst.—Ovarian cyst with twisted pedicle is associated with a sharp sudden pain on one side or the other which continues with evidences of abdominal tenderness and rigidity. The excruciating colics, the steady pain, the soreness of the abdomen, and the fact that it springs from one side of the pelvis, together with the metrorrhagia which so often follows the twisting of a pedicle, afford one of the best counterfeits of ectopic gestation. Such cases are,

of course, comparatively rare, and are not difficult to diagnosticate unless the tumor which is twisted on its pedicle was not known to exist prior to the colics, and to the atypical menstruation. In ovarian cysts with twisted pedicle the last menstruation is not usually belated. If the twist is marked, hemorrhage occurs in the cyst and in the pedicle, and degeneration of tissue occurs, associated at first with localized peritonitis and accompanied with such abdominal distention and rigidity of the abdominal wall that bimanual examination often makes the diagnosis with difficulty. Continuation of this condition may lead to a more general peritonitis. Adhesion of the ovarian cyst to the surrounding structures occurs early.

Metro-endometritis.—Acute metritis or metro-endometritis, not associated with pregnancy or abortion, is usually of gonorrheal origin. Involvement of the endometrium itself causes very few symptoms, but involvement of the uterine wall causes a sense of weight and fullness in the pelvis. Tenderness is felt in the lower abdomen, and there is sensitiveness on moving or jarring, with colicky pains due to uterine contractions. Even in the apparently localized cases there is probably a certain involvement of the tubes, and perhaps of the peritoneum. There is fever and rise in the pulse-rate, and examination shows an enlarged sensitive uterus, from which is discharged a greenish, thick pus containing gonococci.

The same pain, but slighter, is present in the chronic stage, or in subacute cases. Acquired uterine dysmenorrhea often results. Occasionally, pelvic pain is experienced between menstrual periods, generally in the uterus, but the pain is often referred to the umbilical region or toward the ribs. The uterine pains are due to uterine contractions and, when experienced between periods, are probably due to retention of secretion with resulting uterine stimulation. More frequently than pain, there is noted a sensation of pressure in the pelvis, frequent desire for defecation and urination, pain in the back and in both legs. These are due to the associated pelvic congestion acting on a uterus, ligaments, and connective tissue made sensitive by inflammation and infiltration.

Uterine inflammation with associated pelvic inflammation may cause severe pain, felt from the crest of the ilium down along the

course of the sciatic nerve. Pain may in some cases be felt in the lumbar region and at other times in the region of the pubis. Practically the same symptoms are present with the milder forms of involvement by the other cocci and bacteria which produce infections post partum and after abortion or with intrauterine manifestations.

Pelvic Peritonitis.—When an acute gonorrheal inflammation extends into the tubes and involves the peritoneum, and is productive of pyosalpinx and of localized peritonitis, the symptoms are those of a severe pelvic peritonitis associated with marked pain and tenderness, with abdominal distention, temperature, etc. Bimanual examination shows a mass on one or both sides of the uterus, but in some cases, with much purulent exudation, the tubes and ovaries cannot be made out. Practically the same symptoms are present with the pelvic peritoneal involvement produced by the other cocci and bacteria which produce infection post partum or after abortion or intrauterine manipulation. On the other hand, a non-virulent latent gonorrhea may extend gradually through the tubes, may involve the peritoneum and produce extensive adhesions without acute onset. Its cause may be slow and gradual and may affect the patient's general health long before pelvic symptoms are annoying enough to attract attention.

Recurrent attacks of severe pelvic peritoneal pain may be due to recurring attacks of appendicitis, but are usually due to recurrences or exacerbations of a localized pelvic peritonitis originally due to the upward extension of a gonorrheal infection through the Fallopian tubes. This is most commonly noted in gonorrheal infections of the nature of pyosalpinx. Exertion, lifting, and other conditions cause an opening of the tube and the pouring out of more pus into the peritoneal cavity. This occurrence is associated each time with a new attack of pelvic peritonitis. Wertheim says that this recurrence of attacks may be due to the invasion of the peritoneum by gonococci which have passed through the tube wall.

Acute Parametritis.—Pain localized in one side or the other may be due to a rapid or slow infiltration of one or other of the broad ligaments by an acute or subacute cellulitis, either serous, serofibrinous, or purulent. Even in the early stages this condi-

tion can be made out by bimanual examination, when a mass will be felt on one side of the uterus, extending gradually over toward the pelvis, and in the later stages producing a bulging into the fornix and extending upward so that the upper rounded borders can be made out through the abdomen above Poupart's ligament. An affection of the broad ligament or of the posterior parametrium may occur in this acute fashion after labor, also after abortion, and also after operations on the cervix, especially if this cervical operation is preceded by forcible dilatation. On the other hand, these conditions, especially the involvement of the posterior parametrium, may occur as a slow progressive involvement associated with cervical catarrh, or may come on gradually after labor.

Salpingo-oöphoritis.—Gradually oncoming or progressively more intense pain, felt on one side or the other or both, is usually due to a slow upward extension of an infection through the Fallopian tubes, or to the organization of adhesions long subsequent to subacute or severe attacks of pelvic peritonitis. This condition is a most frequent cause of one or both sided pain in women It is extremely frequent in women who are sterile and in uniparæ. It constitutes a one or both sided salpingo-oöphoritis. The tube is somewhat swollen, the outer end is closed or covered by adhesions, the ovary is cystic and covered by adhesions, and the tube and ovary are adherent to the posterior wall of the broad ligament. It is often noted in women who have been curetted for sterility. Its etiology is to be sought in an upward extension of an inflammation resulting from the curettage and due to the ordinary septic bacteria of mild virulence, or more frequently to the gonococci present but unrecognized. Curettage is often done for cervical catarrh and for uterine catarrh, and these cases not infrequently result in a mild salpingo-oöphoritis. After abortion or labor pain may come on early, with an acute or subacute infection. If it comes on gradually and later, it is due to the upward extension of an infection from the uterus. A slow infection of the peritoneum is typical of a latent gonorrhea.

Pelvic Tuberculosis.—Eight to 10 per cent. of the tubes removed for inflammatory diseases are tubercular. The *tubes* are infected from the peritoneum or from other internal organs, or through the medium of the blood or by infection from below. The

tubes are involved in 30 to 40 per cent. of the cases of tubercular peritonitis. The abdominal end is most frequently affected and both tubes are involved to the same degree.

(*a*) The miliary form gives an appearance like that noted in catarrhal salpingitis. (*b*) The local diffuse form is most frequent. The tubes are thickened and filled with a cheesy matter. The adhesions are marked and involve the uterus and the sac of Douglas, the sigmoid, and the rectum. The tubes vary from the size of a walnut to that of a child's head. If pus is present, the infection is generally a mixed one, the bacteria being either the gonococcus or the pyogenic bacteria. (*c*) The tubes are enlarged, thickened, and hard, and constitute the fibroid form (Maylard).

The symptoms are menorrhagia, metrorrhagia, and dysmenorrhea. With mixed infection fever is present. The diagnosis is a difficult one. This form probably constitutes a fair percentage of the tubal diseases in the virgin characterized by the symptoms of salpingitis and a slight rise of evening temperature.

Ovarian involvement by tuberculosis is usually a bilateral one. There may be a peri-oöphoritis with tubercles on the outer surface of the ovary; or, miliary tubercles in the stroma of the ovaries; or, discrete or confluent foci of caseating material. The ovaries are usually bound together with the tubes.

Tubercular peritonitis is four times as frequent in the female as in the male, and this is said to be due to the infection of the tubes. The general primary seat, however, is in the bronchial glands, lungs, and pleura. There need be no tuberculosis of the intestines, for the bacilli may pass through the intestinal wall, or may pass out from the retroperitoneal lymphatic glands, or may be carried through the lymphatics or through the blood from the lungs or joints.

The peritoneum may become infected from the tubes, from the intestine, or from the retroperitoneal lymphatic glands. The symptoms of tubal involvement are those of salpingitis or of pyosalpinx; sometimes characterized by recurrent attacks of localized peritonitis. Fluid, if it accumulates at all, gathers gradually.

The larger number of cases of tubercular peritonitis are characterized by the symptoms of pyosalpinx or of ovarian cyst. The latter is the case if the tubercular peritonitis is associated with the

accumulation of fluid. Tubercular peritonitis is then of the serous, ascitic form. The onset may be insidious, with the symptoms of tenderness and colicky attacks and sense of fulness. The onset may, however, be sudden. The symptoms are then acute, associated with pain and tenderness, and the abdomen fills with fluid in a few days. The accumulation of fluid may be localized or encysted.

Another form of peritonitis is the dry one, associated with adhesions, and called the adhesive or fibroplastic form.

The Relation of Appendicitis to Pelvic Annoyances.— There are conditions occurring in the right lower quadrant of the female abdomen which at times so simulate each other as to symptomatology that, in the early stages especially, a differential diagnosis is ofttimes difficult. Certain cases of ectopic gestation and ovarian cysts with twisted pedicles may render a differential diagnosis from appendicitis necessary, but the most frequent conditions in which doubt exists are acute, subacute, and chronic appendicitis as distinguished from acute, subacute, and chronic inflammatory diseases of the adnexa. In so far as the appendix and in part the adnexa are covered by the peritoneum, any infection of the peritoneum may involve both of these areas. For the very same reason the element of physical contact comes into play. There are instances of inflammatory involvement of the appendix in which this structure is so situated that it becomes attached to the uterus, to the tube, or to the ovary. There are, on the other hand, conditions involving the tube and ovary, and even the uterus, in which adhesion of primarily uninflamed appendix to these structures results. The element of the situation not alone brings these two structures into relation, but makes the differential diagnosis at times difficult.

There are cases of *acute gonorrheal involvement of the tubes* with more or less extensive peritonitis in which the differential diagnosis from appendicitis must be made.

Patients are attacked suddenly with pelvic and abdominal pain, rise of temperature, etc., and the diagnosis of appendicitis is usually made. Vaginal examination plus the examination of the cervicouterine secretion by microscope aids in making the correct diagnosis. In such cases there is a double pyosalpingitis, the omentum

is often adherent to the uterus or adnexa, and the sigmoid and its epiploicæ are likewise involved. The outer ends of the tubes are generally adherent to the posterior wall of the broad ligament. The intestines and peritoneum are not markedly injected. The uterus seems large and soft, like the pregnant uterus.

Now, cases of this acute nature, and especially cases of a subacute nature, may eventually result in such a situation of the adnexa of the right side that only operation can definitely settle the original site of the inflammation.

The uterus may be movable or retroflexed and fixed, and there may be unilateral or bilateral pyosalpingitis which is not clearly made out. The annoyance is experienced on the right side because the ovary and broad ligament of that side are most markedly involved and because the ovary is fixed near the pelvic brim. Even the sigmoid may be adherent to the right pelvic brim and physical examination leads to the diagnosis of chronic appendicitis. In such cases the appendix and the mesoappendix are almost certain to be involved in the inflammatory adhesions.

So far as the appendix with its peritoneal covering is concerned, it is perfectly natural, as we have seen, to expect that inflammatory involvement of the adnexa with which a peritonitis is associated may by contact or direct continuity involve the appendix together with other intestinal structures in peritoneal adhesions. An important question is, Do milder inflammatory diseases of the adnexa cause appendicitis? Continuing out from the broad ligament along its upper border and extending to the lateral wall of the pelvis and running up practically to the base of the appendix, is situated the right ligamentum infundibulopelvicum. This structure, as well as the broad ligament, is rich in lymphatics, and it has been stated that involvement of the adnexa may cause an extension of bacteria through these lymphatics up to and involving the appendix. While this opinion has been expressed by more than one observer, it must be remembered that appendicitis is an affection which occurs from the lumen of that structure, and that bacteria, if they did pass up through these lymphatics, may and do cause infiltration or induration about the cecum and the mesoappendix, but could not be responsible for the occurrence of acute or subacute appendicitis. Those men who make

it a routine practice to remove the appendix in all abdominal gynecologic operations are in a position to verify this assertion. I have not been able to find a causal relation occurring by this path of lymphatic extension. I agree with H. J. Boldt, that inflammatory diseases of the adnexa do not produce inflammatory involvements of the mucous membrane of the appendix.

Inflammatory changes of a marked nature may be present in the tubes, ovaries, and broad ligaments, and yet the associated peritonitis and peritoneal adhesions are slight. In such cases the connective tissue of the broad ligaments may be markedly involved. Yet with such a chronic alteration in the broad ligament lymphatics the appendix is found to be normal. Were the lymphatic connection with the appendix a ready source of involvement of the latter structure, we should find evidences of this relation on operation.

The question under discussion takes on a quite different phase when we consider diseases of the adnexa as possible sequelæ of appendicitis. Take, for instance, the question of *tuberculosis*. Tuberculosis of the tube and ovary may occur by upward extension of tubercle bacilli through the cervix, or tubercle bacilli may be deposited through the medium of the circulation, or tubercle bacilli may involve the tube and ovary subsequent to their presence in the peritoneal cavity. Whatever may be said as to the occurrence of such an infection through the first two channels, it is undoubtedly true that in the vast majority of instances tuberculous involvement of the appendages occurs subsequent to the presence of tubercle bacilli in the peritoneal cavity, with or without microscopic evidences of tubercular peritonitis. The tubercle bacilli, when present in the peritoneal plasma, are carried into the tube lumen by the action of ciliated epithelium, and however much or little the peritoneal covering may be involved by tuberculosis, the lumen of one or both tubes is rarely ever free of tubercles. I had the opportunity on one occasion to make microscopic sections in a case of tuberculosis of the adnexa in which the appendix was removed. The appendix on examination contained tubercles and giant cells, and they were not present on the peritoneal surface, but were present in the structure and lumen of the tube, so that

the tuberculous appendicitis was part of the primary condition and the tubercular adnexitis was secondary.

Now, as to the question of appendicitis. When an involvement of the appendix takes place and there occurs an associated peritonitis more or less localized or more or less diffuse, we are dealing with streptococci or bacterium coli principally, in the peritoneal exudation. This exudation need not be great or extensive; it need not extend down deep into the pelvis. It may be slight and localized immediately around the appendix, yet the action of the ciliated epithelium in the tubes attracts toward the adnexa and takes up into the tube lumen these infecting bacteria. Here we have the possibility of an involvement of the peritoneal covering of the tubes, and especially the possibility of an involvement of the ovary and its Graafian follicles.

I have for a long time noted the occurrence of tubal and particularly ovarian involvements, generally affecting the right side, which occurred in patients in whom an infection from below, except of the mildest type, could be almost excluded. In addition, these involvements were not at all of a nature which spoke for gonorrhea, and the tube was generally open. They developed in individuals at a period of life when the lesions cannot be referred to the infectious diseases of childhood, and the history in many cases pointed distinctly to previous mild or more serious involvements of the appendix. Thus, I came to the conclusion that the bacteria thrown out in the peritoneal exudate resulting from appendicitis produced an involvement of the uterine adnexa. This involvement naturally varies in different individuals, according to the susceptibility of the peritoneum to inflammation and to adhesions, according to the virulence of the bacteria, and the resistance of the patient and other factors which we are at present unable to distinctly determine.

It might be expected that evidences would be present in the genito-urinary tract which would definitely settle for us, in all cases, the point from which the infection started; but we all know that, especially in subacute and chronic cases, evidences in the cervix and uterus may be almost wanting and the point of origin of the infection is therefore doubtful. The history of previous attacks does not always give a definite picture pointing clearly

either to appendicitis or to infection of the adnexa from below. Marked appendicitis may cause such a pelvic peritonitis as to involve both tubes and ovaries very markedly. Omentum may be adherent to uterus and adnexa. Both tubes and ovaries are bound down by thin cobweb adhesions. Both ovaries are cystic, and the right one especially may contain one very large single cyst. The right side is more involved in structure and by adhesions than is the left. In such cases the appendix is of course very markedly involved, and in one of my cases was spontaneously amputated from the cecum and connected with it by adhesions only.

Primary involvement of the appendix of a slight degree may affect especially the right adnexa. The associated peritonitis produces a pelvic peritonitis; the right tube is often closed and adherent, and the right ovary is enlarged and cystic and often contains one large Graafian follicle cyst.

(1) Appendicitis in the form of an inflammation of the mucous membrane does not result from inflammatory diseases originating in the uterus or adnexa. (2) Involvement of the appendix viewed as a peritoneally covered organ may take place as part of a peritonitis more or less localized, or more or less extensive, which has its origin in inflammatory diseases of the adnexa. (3) Severe inflammations of the appendix, in so far as they cause a pelvic peritonitis, or in so far as the accumulation of pus is located in the pelvis, naturally involve the uterus and adnexa in adhesions, do not cause pyosalpinx, but may cause tubo-ovarian cysts. (4) A differential diagnosis as to original site of the infection is often impossible, except from the operative clinical standpoint, and even then is not always certain. (5) Mild attacks of appendicitis without the production of well-defined peritonitis may involve the adnexa without adhesions, but especially by infection of the Graafian follicles, alterations of the ovarian stroma, and the production of varicocele of the broad ligament.

Varicocele.—There is often noted in one or other of the broad ligaments a tremendous dilatation of the veins in the upper part of the broad ligament and near the hilus of the ovary. This condition is like that in the male known as varicocele. It is quite certain that many cases of unilateral or bilateral pain often diag-

nosed as salpingo-oöphoritis show on operation this alteration in the upper border of the broad ligament. By many this is considered to be the result of the displacement of the uterus and interference with the circulation of blood to and from the uterus. It cannot be denied that this condition is often found in retroflexion; however, it is by no means infrequent where the uterus is normally placed. Varicocele is often found in the uterovaginal plexus and uterovesical just as in the pampiniform and is characterized by decided varicose dilatation of the veins. Through the slight development of valves changeable degrees of dilatation are produced by sexual excitement, menstruation, position of the uterus, subinvolution, etc., which may cause many backaches heretofore not explained. In some cases there may result a varicocele, in the region of the trigone. While it cannot be denied that circulatory causes may be responsible, yet I have found the condition so often combined with pathologic changes in the tubes and ovaries that it constitutes in many instances a para-oöphoritis, that is, a parametritis involving the upper part of the broad ligament, and more particularly the area situated near the ovary, and also the ligamentum infundibulopelvicum. While the cause of this condition is most frequently an infection extending from the cervix or uterus after labor, abortion, or curettage, yet a primary involvement of the peritoneum may also be the cause.

Oöphoritis.—Pain in the right or left side or both sides, but especially on the right side, is frequently due to a structural involvement of the ovarian tissue without the presence of adhesions or closure of the tubes. With this is very frequently associated a varicose condition of one or both broad ligaments or a shortening of one or both ligamenta infundibulopelvica. This condition of varicose veins of the broad ligament may be due to thrombotic or other changes subsequent to curettage, or to mild and often unrecognized infections extending into the parametrium from cervix or uterus, especially after labor or abortion. These may be responsible, through circulatory and interstitial disturbances, for changes in the structure of the ovary and for the production of small cystic degeneration, or cirrhosis. It is certain that appendicitis, too, may cause such a change in the broad ligament and may

produce inflammatory changes in the ovary. These are often found on the right side combined with the special symptomatology of ovarian involvement and with a shortened ligamentum infundibulopelvicum. This pathologic involvement of the ovary and broad ligament of the right side is often noted at operation to be associated with involvement of the appendix and the mesoappendix.

As a result of any of the above causes the ovary may be altered in size and contain cysts. The tunica albuginea may be thickened and the stroma may be indurated, so that the term "cirrhotic ovary" seems justified occasionally. *The characteristics of this ovarian involvement are not modified greatly by the symptoms of the involvement of the appendix.* So far as the ovary is concerned, there is a steady, gnawing, burning pain, which often *radiates into the thigh or extends upward toward the ribs or which may be felt in the iliac bone.* The pain is more noticeable after walking or on exertion, and is therefore most marked at night. During the week preceding menstruation it increases in intensity, and on the establishment of menstruation it may grow less or it may continue. An associated annoyance is *nausea*, which may be felt before, during, or after menstruation, and which is sometimes very marked. The pain felt in the ovarian region may at some menstrual periods be marked, at other periods less severe. The reason for these symptoms can be readily understood. We are dealing with an ovary, altered in structure, and with a varicose broad ligament. Menstrual congestion produces hyperemia in these structures, and pain is therefore increased during the premenstrual period. If a follicle ripens in the involved ovary, the pain is more severe. If the tunica is thickened, the rupture of the follicle is prevented and the follicle increases in size. Rupture of the follicle eases the pain. Bimanual examination at an intermenstrual period may show nothing palpably except a sensitive ovary. It may, if frequently repeated, show the period of greatest pain to be associated with the presence of an enlarged ovary and an unruptured follicle. Women with these alterations may suffer for months and years with this almost constant but not always severe pain, which eventually has a harmful and injurious effect on their physical and nervous state. Even though this ovarian pain is most frequent in women with an asthenic nervous system, and even

though the pain is caused by the functional congestion of menstruation and by ovulation, nevertheless it is this function, carried out in an ovary altered even though slightly as to its stroma and tunica, which causes the local annoyance. Often enough there is associated a uterine displacement or enteroptosis or ren mobilis which is considered the cause of the pelvic annoyance. When these patients are finally reduced to a state of nervous and physical asthenia, the diagnosis varies from appendicitis, movable kidney, nephrolithiasis, to neurasthenia and hysteria. A close study of the history of the case, of its development, and of its course, shows the annoying symptoms to be related to the functional activity of the ovary. Sometimes these cases are correctly classed under ovarian dysmenorrhea. More often the appendix is removed through a small incision, or an Alexander Adams operation is done, or a movable kidney is fixed, and, naturally enough, the symptoms continue. It is certain that a neurasthenic predisposition renders patients more sensitive to pain, and that alterations in the ovary need not be marked to produce the symptoms mentioned above. On the other hand, the long duration of pain is sure to increase the neurasthenic predisposition and may bring on a state of semi-invalidism.

The differential diagnosis between such a chronic oöphoritis and salpingo-oöphoritis cannot always be made. There is a disease of the ovary, called ovarian neuralgia, in which the pain comes on suddenly, lasts for a few hours or a day, and ceases suddenly at the menstrual period. This is considered by some to be an ovarian neuralgia, while by others it is considered to be simply the result of an oöphoritis of the form just described.

Right-sided Pain.—Prolonged right-sided pain from which women suffer is not always easy to diagnose. In fact, the differential diagnosis between an involvement of the appendix and involvement of the ovary is often extremely difficult. We are very frequently concerned with those cases where both conditions are present. If a previous severe, sharp attack of appendicitis has produced peritoneal involvement around the tube and ovary of the right side, these structures are bound down by adhesions, but pus is not found in the tubes. It is not necessary that the

appendix be attached close to the tube and ovary, but usually in these cases there are thin adhesions around the appendix or the appendix is attached behind the cecum. The meso-appendix is shrunken. Bimanual examination divulges a sensitive adherent tube and ovary, and only the history in many cases permits of the diagnosis of a causal appendicitis.

Pregnancy.—In pregnancy pain is a frequent symptom, localized in one side or the other, and due perhaps to some inflammatory involvement of the tube and ovary. On the other hand, there are pains that are localized in the uterus, in which the fault is probably to be sought in an inflammatory involvement of the endometrium. In pregnancy, too, a pyelitis must be excluded. This condition is not so very infrequent.

The pain in abortion in many cases is a sense of fullness and weight in the pelvis like that associated with menstruation, but more intense. The pains of labor are simulated, however, in some cases when the uterus contracts actively and the cervix dilates. In the expulsion of the ovum in whole or in part, or when large pieces or clots are being expelled, there is, of course, the associated bleedings, which with a history and bimanual examination make the diagnosis.

Backache.—The most frequent causes of continued backache are pelvic congestion and parametritis posterior. The latter represents an involvement of the lymphatics of the uterosacral ligaments or the posterior parametrium by a previous cervical infection or by a chronic cervical catarrh. Infiltration of lymphatic connective tissue around the rectum is an added cause. The presence of rectal ulcerations is to be excluded. Involvement of the coccyx is another factor. It is important in backache to see if bimanual examination or manipulation will produce this pain or the sensation of stretching and discomfort in the rectum of which the patient complains. The simplest manipulation is to insert the fingers into the posterior fornix and lift the cervix up toward the symphysis. This manipulation puts the uterosacral ligaments and posterior parametrium on the stretch, and if it is productive of the same pain as that of which the patient complains, the diagnosis is made. A large subinvoluted uterus associated with pelvic congestion is often productive of backache, but, as a rule,

those cases which produce the greatest annoyance are those in which there has been chronic inflammation of the cervix or uterus, with deep laceration of the cervix and with chronic involvement of the cellular connective tissue. In many patients backache depends upon rheumatic or gouty diathesis.

Gastro-enteroptosis associated with movable kidney and often with hysteroptosis is responsible for the indefinite, irregular, and changeable position of the pain felt by many women. This splanchnoptosis is often present in women who have borne several children. There is an inelasticity of the general elastic structures of the body and of the abdominal wall. Errors of digestion and general nervous symptoms are present. The pelvic congestion associated with the enteroptosis, and particularly the hysteroptosis, produces a sensation of weakness in the back, a sensation of dragging, and in some cases a steady dull feeling described as a pain. In this connection it must be stated that retroversion and retroflexion are considered to be often a cause of backache and of pelvic discomfort. This is due to the hysteroptosis. I am of the opinion that the very vast majority of cases of retroversion and retroflexion with which pain is associated are really due to inflammatory conditions in the uterus, but are more particularly due to pelvic parametritis and to unrecognized ovarian involvement. Salpingo-oöphoritis is in many cases a lesion which cannot be readily made out by bimanual examination, and when associated with retroversion or retroflexion this displacement of the uterus is often considered to be the cause of the annoyances.

Pain felt at a regular menstrual period, and developing at the time that menstruation began or later, is known as dysmenorrhea. Dysmenorrhea, when acquired, is usually of an inflammatory nature. It may be due to processes occurring in the uterus near the internal os, or in the lining or wall of the uterus, or in the tubes or peritoneum or ovary. When such infiltrated, inflamed tissues are stretched by the congestion of menstruation, sensitiveness and pain are naturally excited.

Bone Changes and the Internal Secretions.—The ovaries are related to the thyroid, the thymus, the adrenals, the pancreas, and the hypophysis. The thyroid, the chromaffine (adrenal) system, and the hypophysis stimulate bone growth. The pancreas and

parathyroids retard the same. Bone changes may be influenced by the thyroid, as is seen in myxedema. Diminished thyroid or removal of the thyroid heals fractures poorly, causes a stationary state of growth, a diminished calcification of the dentin. In hypothyroidism there may be, however, a decided development of the skull. If the thymus is removed there is inhibition of bony growth and some atrophy of the ovaries. After removing the thymus there occur osteomalacic and osteoporotic processes, the entire organism lacks calcium, and there is diminished building of the skeleton; fractures heal poorly. The thymus is the important organ of the nuclein synthesis. When the thymus is no longer present, other substances dissolve the calcium salts or hold them in solution. When the thymus is removed the peripheral nervous system is excited, which excitement is diminished by hypodermic injections of calcium lactate. Early castration may influence the pelvis, by resulting in the continuation of its infantile form or the development of the male type. Removal of the hypophysis may cause the development of dwarfs. Certain diseases of this gland show relations to the thyroid. The adrenals, through their increased blood-pressure, produce enlargement of the bone-marrow spaces. Adrenalin works especially on phosphorus, kalium, and natrium changes. After removal of the adrenals excretion of phosphorus is increased. The pancreas acts like the parathyroids and has an opposite rôle to the thyroid. In pregnancy the hands and feet become larger, the face wider, the features plump, etc. This may be partly due to fat or to light edematous swelling, yet at this time there is increased growth of bone, so that an individual becomes more robust and larger. These conditions simulate acromegaly, and are probably the result of hyperfunction of the hypophysis. Kolisko calls attention to a great increase in weight after eclampsia, due to a sclerosis of the bones of the pelvis, the cause of which is not clear. Some speak of a physiologic osteomalacia of pregnancy. Too frequent labors result readily in rhachitis in the later children if they are being nursed by the again pregnant mother. The placental secretion seems to cause an increased blood-pressure. Hypertrophy of the thyroid occurs during pregnancy. The same change occurs in the adrenals, which

show characteristic changes; the same thing happens with the hypophysis, especially the anterior lobe. There is an increase of the chromaffine cell elements of the hypophysis and the Haupt cells form the so-called pregnancy cells. After disappearance of the sexual function in women there may develop, aside from senile osteomalacia, Heberden osteophytes, and other atrophic or hypertrophic bone affections, occasionally inflammatory bone affections, as well as alterations against which thyroid and not ovarin seem to work well.

Osteomalacia and Pain.—This condition of softening of the bones and pelvic pain favors in numbers to a tremendous degree the female sex. As regards the beginning of this condition and the recurrence certain phases are of importance, such as puberty, as a result of the hyperemia of bone tissue which occurs at this time, but most influential is pregnancy. The typical ovarian form, which affects the pelvis, is to be contrasted with the type which affects the extremities. Fehling holds the ovarian theory, which says that the ovaries produce trophic disturbances in the bones, an angioneurosis with evidences of hyperemia and increased CO_2 content. The changes in the bones and the other annoyances in osteomalacia increase during menstruation, while castration often produces a marvelous healing. There is increased fertility in these patients. There are various rheumatic pains at the time of menstruation and increased annoyances during pregnancy in the puerperium. In some cases there are fibrillary muscle contractions and intention tremor. There may be neuralgias of the pelvic nerves and of the foot nerves. There may be marantic symptoms, disturbances in walking, inability to work, development of edema, decubitus ulcers, sleeplessness, psychic depression. The most frequent locations for the bony disturbances are in the vertebræ, the lower extremities, and the pelvis. The symptoms may be mistaken for myositis, paralysis of muscles, polyneuritis, chronic myelitis, irritatio spinalis, and also functional disturbances, such as neurasthenia and hysteria. There may occur a combination of osteomalacia with affections of the thyroid, such as morbus Basedowi. The results of osteomalacia are marasmus præcox, diabetes, and tuberculosis of the lungs. Drugs are calcium and

iron, bone-marrow, in the form of a glycerin extract, thyroid, ovarin, especially ovarian antibodies, such as the serum of castrated animals. Some use adrenalin. Castration works the best of all.

There is a tendency to recurrences of joint affections of the gonorrheal nature during pregnancy. Pregnancy in the last month makes this condition worse and latent infections become more virulent.

Diseases of the pelvic nerves, such as "pelvic neuralgia," may be due to very different causes, such as rheumatism, osteomalacia, lues, tuberculosis of the ileosacral and symphysis areas, fragments of bone, masses of callus, and bony tumors.

TREATMENT OF PELVIC PAIN

In acute inflammatory stages we make use of absolute rest in bed, cold applications to the abdomen, or the cold coil. When peritoneal irritation is present, the ice-bag should be used, but the patient should not be annoyed by its weight. The bowels should be regulated. With high continuous fever sponge-baths or cold rectal irrigations should be used. Vaginal cleansing douches are of value to remove abundant secretion, and should be given at a temperature of 70° to 80° F., but with low pressure.

The vast majority of the cases can be carried through the acute stages by conservative treatment. If conservative treatment is carried out for a fair period of time without improvement, it is no longer indicated. When high fever and marked peritoneal irritation complicate a pus sac with thin wall or an abscess of the ovary, operation is necessary. If observation of the temperature, careful repeated bimanual examination, and a leukocyte count show continuation of high temperature, the finding of a constantly growing pus focus, the continuation of a leukocytosis over 15,000, and the existence of peritoneal irritation and pain, we are concerned with a purulent accumulation, which demands vaginal incision and drainage.

If, however, on the use of conservative treatment fever ceases and pain diminishes, cold applications are substituted by stimulating applications to the abdomen, and subsequently by the ad-

ministration of long sitz-baths of 95° F. Any return of temperature demands the treatment applicable in the acute stage.

Remarkable benefit and improvement are obtained by rest in bed for long periods of time. The associated congestion and edema of the broad ligaments diminish, and eventually there results a marked resorption of the inflammatory exudate, leaving the adnexa in such a state that if operation is necessary, we are dealing mainly with adhesions of the peritoneum, with alterations in the tubes and ovaries, but with relatively normal ligaments as regards infiltration. If the condition results in pyosalpinx, conservative treatment carried over a long period of time, supplemented by the use of warm abdominal applications, produces a thickening of the pus and often furnishes a pus sac whose contents are sterile. I have treated many cases by this conservative method, and, especially in such as have occurred after labor or abortion, and subsequent operation, when necessary because of pain, has shown a surprisingly slight purulent involvement of the tubes and peritoneum in many cases.

In the treatment of very chronic adnexal diseases much heat should not be used so long as fever continues. Later, stimulating abdominal applications should be made, warm douches with small amounts of water should be given, and warm sitz-baths of ten minutes' duration may be taken. If fever has not recurred and no pus sacs are present, long, profuse, hot vaginal douches and warm abdominal compresses should be used. Warm prolonged sitz-baths and full baths are of value.

In chronic cases without fever, where pus accumulations are absent, this treatment should be supplemented by regular thorough packing of the vault of the vagina with gauze. This method, plus massage, may cause pain to disappear and menstruation to become regular. This is brought about through the increased blood-supply furnished to the uterus and tubes, as a result of which the inflammatory products may be absorbed and pregnancy may take place. The use of the Nauheim baths and of sitz-baths is of value in the chronic stage and recurrence of attacks is often avoided. In many cases, especially the gonorrheal form, very slow improvement takes place, for the original condition remains unchanged, through either the virulence of the gonococci or the susceptibility of the patient.

The same methods of after-treatment apply to those cases which have been incised vaginally.

The treatment of the cervical conditions is given in the section on Cervical Catarrh or Endocervicitis, and implies the use of vaginal pressure therapy and the use of appropriate douches, sitz-baths, and abdominal applications.

Subacute or chronic inflammations not associated with pus constitute a goodly portion of the cases coming for ambulatory treatment. It is necessary to take into consideration the associated vulvitis, vaginitis, cervicitis, parametritis, and endometritis, if any or all of these be present. It is in those cases in which there has been peritoneal involvement that I personally consider intrauterine therapy harmful. Hence treatment is limited to what can be accomplished through the vagina. The vagina is, of course, at each treatment thoroughly cleaned. Erosions, if present, are treated by carbolic acid and iodin, and later on by silver nitrate, as mentioned in the section on Cervical Catarrh. The vault of the vagina should be thoroughly painted two or three times a week with tincture of iodin. Boroglycerin or ichthyol-glycerin should be poured into the speculum and the posterior fornix and the upper part of the vagina should be gently but thoroughly packed with gauze. We accomplish thereby pressure of a gentle sort, a mild stretching of adhesions, and favorable alterations in the pelvic congestion, added to which is the influence of dehydration on the uterus and cervix. After such vaginal packings the patient should go home and go through no exertion.

On removing the vaginal packing after twenty-four hours the patient should take a hot vaginal douche, after which she should lie down for a period of one hour. During the menstrual periods patients should be extremely quiet, for during this time recrudescences of inflammatory processes may occur. In the course of time it is possible to relieve many of these patients of their annoyances, and prolonged hot vaginal douches, followed by massage by the bimanual method, may bring a fixed uterus back into normal position, so that in some instances a pessary may be worn with comfort. The degree of annoyance does not depend on the amount of infiltration or the extent of adhesions, but rather on the individual sensitiveness of the patient. In some cases slight changes

cause marked pain, while in others marked alterations cause relatively little annoyance.

In many cases the Nauheim baths have a remarkable resorptive influence on pelvic inflammations in the afebrile period and a very beneficial effect on congestions and those infiltrations in the pelvic cellular connective tissues which are productive of so much pain and backache.

Retroflexions and versions, especially if associated with descent of the uterus, with non-elastic ligaments and pelvic congestion, demand preliminary treatment by intravaginal pressure therapy, followed by the introduction of an appropriate pessary. The support given to the pelvic organs often quickly relieves the sense of weight and backache. (See p. 99.) Splanchnoptosis and loose abdominal walls are relieved by appropriate abdominal supports or by the use of Rose's bandage. (See pp. 114, 115.) Constipation must be overcome and permanently cured by hydrotherapy, massage, exercises, proper food, etc. (See Constipation.)

Backache may be due to hysteroptosis not accompanied by a retrodeviation. Here we often note marked pelvic congestion. The use of a pessary to hold the cervix high up and far back, the use of an abdominal support, the use of the sinusoidal current (see Constipation) are often of very decided benefit.

Pain may be temporarily relieved by the same drugs as are used for the relief of dysmenorrhea. (See p. 238.) The value of abdominal applications, of douches, of sitz-baths, of counter-irritation, and of electricity for the relief of ovarian pain can be noted by a reference to the sections which deal with these therapeutic procedures.

In many cases no form of treatment removes the pain, which, if long continued, produces sleeplessness, loss of weight, digestive disturbances, and a profound condition of loss of nervous tone and neurasthenia. Only operation brings relief. Aside from conditions associated with adhesions, it is the ovary, and its surrounding area of broad ligament, including the ligamentum infundibulopelvicum, which is responsible for the greatest misery. Lesions which often escape distinct bimanual determination may cause more suffering than gross palpable involvements. We should guard ourselves against the danger of minimizing the degree of

suffering complained of and against the danger of attributing pain to hysteria, neurasthenia, and imagination. We should also refuse to surgically correct displacements for the relief of pain which resists the various forms of treatment without making an exploratory laparotomy. Hence when such uterine displacements are present, an intraperitoneal operation should always be selected. No more grateful patients can be found than those relieved of pain by non-operative methods. Pain is the indication which calls for operative interference when other methods fail. Conservative operations, operations which preserve part of an ovary or part of a tube, when pain is due to these structures and their involvements, are poor surgery. In the vast majority of cases operated on because of pain, preservation of menstruation or attempts to conserve the tubes for the purposes of fecundation are of secondary import and should not interfere with the radical cure of the primary indication. In right-sided pain particularly we should not be content with removal of the appendix, but should remove the right adnexa entirely if the symptomatology points to tubal or ovarian involvement, as is the case in the vast majority of women in whom appendicitis is diagnosed as the cause of the steady, continued pelvic pain in the right side, increased during menstruation. The macroscopic appearance of the tubes and ovaries is no sure guide as to the degree of pain subjectively felt by the patient. If we paid less attention to the operative correction of versions and flexions, if we paid less attention to the supposed need for curettage and to the repair of lacerated cervices and perinea for the correction of pelvic pain, and directed our medical and surgical attention to the cellular connective tissue, to the peritoneum, to the tubes and ovaries, we should be doing our patients greater justice.

STERILITY

After the menstrual function is established, ripe ova are supposedly given off at regular intervals from the surface of the ovary. As a Graafian follicle gradually approaches the surface of the ovary, the peripheral area becomes continually thinner, until finally the tension produced by the liquor folliculi causes bursting of the follicle, and the ovum leaves its bed and is thrown out into the peritoneal cavity. Here it lies in the peritoneal plasma, awaiting entrance into one or other of the Fallopian tubes. The Fallopian tubes are lined with ciliated epithelium and the outer end of each Fallopian tube is large and lined with folds, which makes the area covered by ciliated epithelium quite extensive. The cilia produce a current which draws the ovum in the peritoneal plasma into the tube. The current created by the ciliated epithelium of either tube is so marked that if one tube is absent or closed, or if the cilia do not functionate, an ovum from an ovary of the affected side may be drawn up into the opposite tube, the cilia of which create a current sufficient to direct and draw the ovum into the tubal lumen, and to carry the ovum on into the uterus.

When active spermatozoa are deposited in the vagina, they pass up by their own efforts, through the cervix and through the uterus, against the current produced by the ciliated epithelium which lines the endometrium, out through the tube against the current created by the ciliated epithelium. The usual meeting-place for spermatozoa and ovum is at the outer end of the tube, though this meeting may take place even within the peritoneal cavity, or probably, too, in the uterus.

Fecundation and pregnancy imply the union of healthy active spermatozoa with a ripe healthy ovum and the passage of this ovum through the tube. Sterility may be due to the absence of one or both of these essential primary factors or to obstacles which prevent their union or to obstruction to the passage of the fecundated ovum through the tube.

CAUSES

Amenorrhea.—Primary amenorrhea may mean absence of genitalia or an underdevelopment of uterus or ovaries. Such a hypoplasia may be primarily uterine or may be secondarily produced by failure of development or of function on the part of the ovaries.

Amenorrhea may be due to adhesion of hymen or to atresia of the vagina or cervix. It is also associated with and due to obesity, in which case the amenorrhea is either absolute or relative.

Secondary amenorrhea may be temporary or permanent. It depends on blood states, on atrophy of the ovaries as a result of infectious diseases, diabetes, and the abuse of opium; it may be due to diseases of the ductless glands; it is often associated with increasing obesity. Amenorrhea often exists simply as a precocious menopause, or is due to lactation atrophy or to atrophy of the uterus produced by too energetic use of the curet or of atmocausis. Amenorrhea of itself, however, does not necessarily preclude the possibility of pregnancy taking place. Ovulation may take place without menstruation, but menstruation does not take place without ovulation.

Spermatozoa.—When normally developed genitalia are present in the female, the cause of sterility cannot be properly diagnosed without first determining the existence and presence of active, healthy spermatozoa. Therefore the examination of the seminal secretion is essential. It may be found that no spermatozoa are present, or inactive spermatozoa may be found, or else they may be present in proper number and in a proper state of activity. Examination of the prostatic seminal secretion is further valuable, for with any of the above states of the spermatic fluid proof of an old inflammatory process in the male genitalia, in the shape of pus cells, bacteria, and cocci, may furnish evidence of the cause of sterility. If pus cells are present and at the same time normal spermatozoa are found, we must often look to the pus cells as explaining the cause of sterility, through the inflammatory processes which may have been set up in the female genital tract. Granted, then, that normal spermatozoa are present, the

next point is to determine the existence of normal ova, unless gross pathologic lesions closing both tubes are found.

Ova.—In a woman who menstruates normally and in whom the uterus and tubes and ovaries seem properly developed, it must be taken for granted that ripe ova are given off at regular intervals. There are cases of properly developed ovaries which produce a normal congestion, but associated therewith is an underdeveloped small uterus. There are other cases with normally developed uterus in which the ovaries are small and fail to produce a normal congestion. In obese patients there is often found a small uterus and the menstrual process is such that insufficient ovarian action must be taken for granted. Such patients are either primarily obese, and have evidenced this condition of the uterus and ovaries from adolescence, while in other patients the obesity and the associated atrophic uterus and diminished ovarian activity are acquired at a subsequent period. There are cases in which Graafian follicles develop, but never to the full extent. Often they do not rupture, but form the so-called atresic follicles. In such conditions we are apt to find various degrees of actual or relative amenorrhea and various degrees of hypoplasia, under-development, or atrophy of the uterus. It is of importance to determine this fact.

Hypoplasia.—Hypoplasia of the uterus is a frequent cause of sterility. The blame does not rest upon the ovaries if menstruation is of normal duration and the congestion from the ovaries is of normal degree. If we are dealing with a uterus concentrically or excentrically smaller than normal and the molimina are slight or irregular, this implies in some instances the absence of ripe ova or the existence of tubes which cannot carry the ovum into the uterus, and generally the existence of a uterus which, as regards its size, the character of the endometrium, and the failure on its part of periodic development to a normal decidua, does not favor the entrance of an ovum into the uterus, or its embedding if it does enter the uterus.

Obstruction to Progress of Spermatozoa.—If normal spermatozoa are found to be present, and if the uterus is of normal size and normal tubes and ovaries are palpated, and if menstruation follows a normal course, sterility is due either to failure of the spermatozoa to unite with the ovum or to inability on the part of the

ovum when fecundated to be drawn into the uterine cavity. Failure of the spermatozoa to unite with the ovum implies an obstruction or obstacle somewhere between the vagina and the outer end of the Fallopian tube. There are cases in which the character of the vaginal secretion is such that the spermatozoa are injured and their activity is destroyed. Such instances, while not frequent, are nevertheless considered possible.

Cervix.—The cervix supposedly furnishes a frequent point of obstruction to the upward movement of the male element. Stenosis of the external os, a long narrow cervix, stenosis of the internal os, or a profuse normal or a profuse pathologic cervical secretion are considered the elements which impede the upward movement of the spermatic cells. However, in innumerable women with extremely narrow or pin-hole external os pregnancy takes place.

There is more reason, however, to attribute to the internal os a position of importance in the etiology of sterility. Here we are dealing not infrequently with a congenital or acquired actual stenosis or relative stenosis due to overgrowth of the cervico-uterine lining. It may be possible for a sound to readily enter the uterine cavity, and yet so excessive may be the amount of overgrowth of the mucous membrane that an obstacle to the moving spermatozoa actually exists. There are cases where the normal mucous secretion of the cervix is remarkably excessive, and yet the spermatozoa pass upward. If, however, the cervical secretion is pathologic as the result of an inflammation or catarrh, there is perhaps more reason to consider its irritating presence as a factor in the production of sterility through injury to the spermatozoa. These conditions existing in the cervix, together with the condition of acute anteflexion with production of obstruction at the internal os, are generally considered as extremely important factors in the etiology of sterility. Some of these cases do finally become pregnant after the cure of the hypersecretion or the cervical catarrh, after dilatation of the cervix, after curettage of the overgrown cervico-uterine mucous membrane, after surgical treatment of the anteflexion, etc., yet the number of cases of sterility cured by these procedures is relatively small and the cervix must not be considered as an all-important factor.

Endometrium.—On the other hand, an endometrium which

has been the seat of chronic inflammation may become so atrophic and its decidual reaction may be so altered as to not admit of embedding on the part of the fecundated ovum. If we are concerned with a hypertrophic overgrown endometrium, we may find in this condition an explanation for certain cases of sterility, because the changes which go on in the embedding of the ovum are such that the ovum is cast off very shortly after it has found its nest. This etiology, however, is more frequently productive of early abortions than of absolute sterility. There are cases perhaps in which the hypertrophic endometrium may obstruct the openings of the tubes into the uterine cavity, but this occurrence is not a frequent one.

The endometrium has a bearing on the production of sterility. If we are concerned with inflammatory endometritis associated with profuse acrid discharge, it is possible that this sweeps out the on-coming spermatozoa, prevents them from coming into union with the ovum, or destroys their activity. It is possible that fibroids of the uterus may so alter the shape of the uterine cavity as to form a mechanical obstruction to the spermatozoa. If so, they must be very large. The number of instances in which pregnancy occurs in the presence of fibromata shows that this obstruction, to be effectual, must be mechanically absolute. Fibroids, if associated with menorrhagia or metrorrhagia, sweep out the spermatozoa as they ascend, or sweep out the ovum as it enters the uterine cavity, or furnish an endometrium which is not well adapted to the embedding of an ovum.

Tubes.—Any inflammation in the tubes, so long as it does not produce adhesion of the mucosa or does not form a mechanical obstruction by adhesions or by the presence of much purulent accumulation, is not necessarily an obstacle to the movement of the spermatozoa, for they pass out to the abdominal end by their own movements against the current created by the ciliated epithelium when present. A very frequent cause for failure of union between the ovum and spermatozoa, however, is the closing of the outer end of the Fallopian tubes by peritoneal adhesions. In this event the spermatozoa cannot pass out into the peritoneal cavity and the ovum cannot enter into the Fallopian tube. In some cases peritubal inflammation causes twists, bends, and constrictions of the tubal lumen.

Ovary.—There are cases in which the ovaries are embedded in adhesions or surrounded by mild cobweb adhesions so that a Graafian follicle which bursts is unable to send its ovum into the peritoneal cavity. This, of course, is an absolute cause of sterility. In other cases the exit of the ovum from the ovary is not prevented, but adhesions at the abdominal end of the tubes prevent the spermatozoa from uniting with the ovum and prevent the ovum from being attracted into the Fallopian tube.

Obstruction to Progress of Ovum by Salpingitis.—Perhaps the most frequent cause of sterility is a mild salpingitis. The ovum and the spermatozoa are able to unite within the peritoneal cavity, but the fecundated ovum cannot enter the uterus. In these cases there are no adhesions around the abdominal ends of the tubes, but the tubes are the seat of a salpingitis of varying degrees. With a salpingitis of even mild character, and especially so if there is a catarrhal salpingitis, the ciliated epithelium of the Fallopian tubes may not functionate. Without action on the part of the ciliated epithelium a fecundated ovum can enter neither the tube nor the uterus. This is an extremely frequent cause of sterility, and in some instances can be corrected or cured when, in the course of time, the salpingitis is healed and the ciliated epithelium is restored to the normal. Strange to say, in the early stages of gonorrheal salpingitis with purulent accumulation pregnancy may take place in the uterus in some instances and in other cases in the tubes.

The Cilia and Sterility.—I have always felt that the internal secretions had much to do with sterility. To my mind a normal functionating ovary evidences itself by a certain, supposedly normal, amount of menstruation. With this as an accepted standard, and with the added weight of a certain degree of premenstrual molimina, we have right to presuppose the existence of follicles which produce ripe ova. The fact that some women who conceive menstruate only every two or three months, and that several cases have come under my observation of women who have borne children and have not menstruated for intervals of one to two years (not because of lactation), does not nullify the general principles just enunciated, for they are only clinical points that guide us in forming an opinion. Hence, with relative

amenorrhea, or with actual amenorrhea, or with the amenorrhea associated with obesity, we have a right to presuppose the possibility that the ova may be at fault, either in not being what may be termed "ripe," or through being retained in atresic unbroken follicles. In this type of case, and also in the form characterized by the various degrees of genital hypoplasia, other factors may come into play. The tubes may be very small, they may be tortuous, and, what is most important, the cilia may be involved. On the activity of the cilia of the tube depends the entrance of the ovum into the uterus. It is a natural supposition that the ovaries, through their trophic effect on the uterus, may be also the factors which activate the cilia. If we have absence of spermatozoa or inactive spermatozoa in the male, why may we not have inactive cilia in the Fallopian tubes? So that, with abnormalities in the ovarian secretion or in diseases involving the thyroid or hypophysis, it is only a rational opinion, and not a reckless conjecture, to point toward the possibility of inaction on the part of the cilia as a possible cause of sterility, and to hold the ovary or some of the other internal secretions responsible.

Congenital Causes.—The causes of sterility in the female are either congenital or acquired. The congenital cases are those in which we are concerned with ovaries which do not produce ripe ova, with tubes which are under-developed and which do not transmit the ovum, or with a uterus which is hypoplastic and does not furnish a proper nest for the embedding of the ovum, or with a cervix stenosed at the internal os, with a very acute anteflexion of the fundus, or with a congenitally narrow cervix.

Acquired Causes.—The acquired causes of sterility in the female are in the vast majority of instances due to inflammation. The diseases of childhood may produce necrotic or hemorrhagic involvement of the cervix, uterus, tubes or ovaries. This may result in stenosis of the cervix or in hypoplasia of the uterus or in hypoplasia of the tubes or in hypoplastic ovaries. The other inflammatory causes are infections by the ordinary inflammatory bacteria or by the gonococcus. These infections may produce an acrid discharge in the vagina and cervix or a hypersecretion of a pathologic character. They may produce a profuse

discharge from the uterus, or they may so alter the lining of the uterus as to prevent a normal decidual reaction, but the most frequent seat of location of the acquired inflammatory cause of sterility is to be sought in the Fallopian tubes. The resulting salpingitis, even with the milder forms, simply destroys the activity of the ciliated epithelium. In the more severe forms there is a pyosalpingitis or closure of the abdominal ends of the tubes by peritoneal adhesions, or the ovaries are enveloped in peritoneal adhesions which prevent the exit of ova, provided that the ovaries still retain their function of normal ovulation. Those causes which produce salpingitis almost surely produce temporary or permanent sterility. There are two forms of salpingitis, which are not due to upward extension of an inflammation, but are the result of tuberculosis and of appendicitis. With either of these two conditions there is a peritoneal involvement associated with the presence of tubercle bacilli, streptococci, staphylococci, or bacterium coli. These, being drawn up into the Fallopian tubes by the action of the ciliated epithelium, produce a salpingitis with a destruction of the cilia, or, more frequently, the tubes show constrictions or the tube ends are closed and the result is sterility.

The history of medicine seems to furnish instances where none of the above-mentioned causes were responsible for the sterility. Here the explanation is referred to a sort of cell incompatibility. As illustrations of this condition are given those instances where husband and wife have no children, and where after marriage to another woman and man each is favored by paternity or maternity. Such instances perhaps are to be taken for granted, but their number cannot be great.

Sterility is of two kinds—primary and secondary. Primary sterility means that a patient has never been pregnant. Secondary sterility means that after a pregnancy (whether it end in abortion or at full term) the patient subsequently is sterile, the so-called "one-child sterility."

Primary Acquired Sterility.—Primary acquired sterility may be due to a gonorrhea which has been acute in its manifestations, but often is due to a gonorrhea extremely mild in its progress, often limited to the tubes, and therefore producing no pain, but frequently extending out into the peritoneum. The frequency

with which cases of primary sterility are treated by dilatation of the cervix, and especially by intrauterine manipulations and by curettage, accounts for the extension of the mild gonorrheal infection of the cervix or uterus into the tubes and into the peritoneum. Cases of secondary sterility are not infrequently temporary, even though they last for years. They are temporary because they are not treated. In other words, nature is given a chance by her own methods to overcome the inflammation in the tubes, and after months or years a partial or complete restoration of the ciliated epithelium is accomplished. In primary sterility intrauterine manipulation is extremely often attempted. Those cases of primary sterility due to mild gonorrheal infection, especially those cases in which pain is a symptom, almost universally prove to have been curetted, and it is this curettage which is beyond doubt responsible for the permanent nature of the lesions producing the primary sterility, because the resulting peritoneal involvement which closes the outer ends of the Fallopian tubes cannot be relieved by any but surgical methods.

Repeated Abortion.—A fecundated ovum shows upon its outer surface a development of cells known as trophoblast cells. It is from these trophoblast cells that the covering of the future chorionic villi and placenta are formed. The characteristic of the trophoblast cells is that by enzyme action they burrow their way into the decidua, digest the tissue in their periphery, perforate the blood-vessels, and thus receive their nutrition from the maternal circulation. These cells form the two-layered covering of the villi, the syncytium, and the cells of Langhans. The uterine lining develops into decidua by a great hypertrophy of the connective-tissue cells, accompanied by dilatation of the vessels and congestion of the whole uterus. So delicate is the relation between the growing ovum and its trophoblast cells, on the one hand, and the decidua and the maternal blood, on the other, that the wonder is not that abortion takes place, but that it does not take place more frequently.

Abnormalities in the ovum itself may be the cause of abortion. These abnormalities consist first in a syphilitic change. It may be taken for granted that an ovum made syphilitic by the fecundating spermatozoon produces an abnormal character of cells, and

the viability of the little embryo is readily affected. If, then, at a very early stage, there is death of the embryo, or if the cells from which the chorionic villi and the future placenta are formed are not healthy ones, it can be seen that the relation between ovum and decidua may be readily disturbed. The ovum is then a foreign body, uterine contractions take place, and abortion results.

The greater number of abortions, however, result from involvements of the maternal tissues. Here syphilis of the mother may be an influence, in that the processes of placental development are carried on in abnormal decidual tissues. There may be, in addition, a failure of proper nutrition of the ovum. Endometritis implies an involvement of the uterine lining, inflammatory or non-inflammatory. It can be seen that an inflammatory involvement resulting in great congestion of the uterine mucosa, or resulting in atrophy of the uterine mucosa, with or without a change in the vessels, destroys the delicate balance between ovum and decidua, or fails to give opportunity for sufficient nutrition of the fetal cells. Overgrown uterine mucosa in the form of hyperplasia, accompanied as it is with tendency to hemorrhage at menstruation, and associated with dilated capillaries and vessels, causes ready capillary hemorrhage. The growth of the trophoblast cells and the extension of the chorionic villi is supposed in every case to perforate capillaries, but if these capillaries are sclerotic or diseased ones, or if congestion is marked, too much blood is forced out and the ovum is frequently loosened from its contact with the decidua serotina or the decidua reflexa. This is perhaps the most frequent cause of abortion, especially of repeated abortions.

Changes in the uterine wall may be responsible for abortion. A uterus which is inflamed by metritic processes, which is hypertrophied as the result of subinvolution, accompanied as it is by congestion and arteriosclerosis, is either stimulated to undue contractions in the course of pregnancy or else is liable to bleeding from brittle arteries. Every uterus, whether pregnant or not, undergoes normal painless contractions, which is nature's method of keeping the uterine muscle in good condition. These painless contractions continue, and in the latter months of pregnancy are known as the Braxton-Hicks painless contractions. An inflamed or sensitive uterus reacts by unusual contraction to the presence

of the growing ovum, and if of sufficiently marked character, results in hemorrhage and mechanical loosening of the ovum.

Secondary Sterility.—Secondary sterility is removed from the field of congenital anomalies and is practically always due to an inflammatory cause. There are some instances, perhaps, where a resulting hypertrophic condition of the endometrium after abortion or labor may obstruct the entrance of spermatozoa into the tubes through overgrowth of the endometrium at the position of the internal ostia, but the largest number are due to recognized or unrecognized inflammations. The recognized inflammations come under the heading of post-partum or post-abortum puerperal infections, in which cases there has been an involvement in the form of a salpingitis, pyosalpinx, or peritonitis. A very large proportion of cases, especially such as are not the result of an acute septic involvement, are due to the gonococcus. In other words, there was in the cervix or uterus a gonorrhea existing before pregnancy took place, or acquired subsequent to impregnation. On the occurrence of abortion or labor, there takes place a mild gradual and often unrecognized upward extension of the inflammation, which in some instances involves the tubes alone, without the production of pain; in other instances involves, in addition, the peritoneum, with resulting peritoneal adhesions. These lesions are not necessarily so marked as to be easily made out by bimanual subsequent examination. Many of these cases have during the post-partum state only a minimum amount of uterine discharge, often accompanied by only slight rises of temperature, and even when sought for the gonococci are found only after most careful examination. This is undoubtedly the most frequent cause of secondary sterility.

TREATMENT

The treatment of sterility should be conservative when inflammation is evidenced or suspected. Treatment should only be radical, so far as operations on the cervix or uterus are concerned, when other causes can be eliminated, and when inflammation of the cervix, uterus, or other structures can be absolutely excluded. In that event dilatation of the cervix, amputation of the cervix, or curettage is justifiable.

General Factors Influencing the Form of Treatment.—If we are to concern ourselves with those cases where an acrid vaginal secretion supposedly interferes with the activity of the spermatozoa, we must separate those forms in which we have simply an abnormally acid condition, from those in which the vaginal condition is inflammatory. In the former it is possible that on the use of alkaline douches the acidity may be overcome. If, however, the inflammatory condition is the responsible factor, it may be taken for granted that only in rare instances is this inflammation limited to the vagina alone, and for that reason the complicating inflammations existing in the area between the cervix and the peritoneum are responsible for the sterility. If we are dealing with a stenosed external os, with a long narrow canal, with actual or relative stenosis of the internal os, and if we can exclude absolutely the existence of any inflammatory factor, we are justified in dilating the cervix. This procedure may be done slowly and gradually by the use of cotton wrapped around applicators or by the introduction of very fine twists of iodoform gauze in the cervix and into the uterus, or by a more energetic dilatation shortly before and after each menstrual period, or, finally, by a surgical dilatation of the cervix, or, better yet, by a high amputation of the cervix. In a certain proportion of cases these procedures result in pregnancy, but their number in comparison with the other causes is very small. This treatment of the cervix should not be attempted in the presence of a cervical or uterine catarrh or if any periuterine inflammation is present.

In examining for the cause of the sterility in 66 cases, Runge found infantile conditions in the cervix or uterus in some and in others the vagina was shallow and gaping so that fluids ran out at once and nothing was retained. Examinations of 17 controls, married women who had borne children, showed retention of spermatozoa in the genital tract, while in 34 of the 66 sterile women, under the same conditions, all the fluids escaped at once and no spermatozoa could be discovered. In treatment he aims to enlarge the posterior vaginal vault and to render the cervix more readily permeable. By packing the end of the vagina with gauze, supplemented by massage or by the use of the mercury colpeurynter, the posterior vaginal vault can be hollowed out into a pocket which

will retain fluids, or a suitable pessary might accomplish the purpose Operative measures may be needed for an extremely shallow, conical vagina with torn and gaping meatus. By raising the foot of the bed or the buttocks the upper vagina can be made to hold more fluid and the escape of fluids is prevented.

If we are dealing with a uterus in which an overgrown endometrium produces presumably very early abortions, and for that reason relative sterility, curettage is indicated provided no inflammation exists. If, however, we are dealing with a uterine discharge, a catarrhal or gonorrheal endometritis, curettage should not be too readily attempted, for it rarely cures the condition and we run the risk of sending the inflammation out into the tubes, the peritoneum, or the cellular connective tissue. The treatment of these uterine catarrhs should be conservative and intrauterine manipulation should be avoided. If, on examination, the tubes are found to be enlarged or sensitive, if the ovaries appear to be inflamed or fixed, or if peritoneal adhesions involve the tubes, ovaries, or uterus, or if a parametritis is present, we have positive evidences of the probable existence of a salpingitis with or without peritoneal adhesions. Such cases are often produced by intrauterine manipulation carried out for the cure of sterility or by the performance of curettage for the cure of sterility. These cases furnish a legitimate field for the practice of conservative surgery on the adnexa for the purpose of removing the obstruction to the exit of the ovum from the ovary or obstruction to the entrance of the ovum into the tubes. These cases, since they are inflammatory in their etiology, yield poor results, however, from the standpoint of cure. For even if the ovary be freed from adhesions, even if the outer end of the tube is opened, even if the outer end of an inflamed tube be resected, we are unable by surgical means to restore the lining of the tubes to a normal ciliated action. Hence we are compelled before or after operation to resort to those local and constitutional hygienic proceedings by means of which the natural resistance of the patient is supposed to cast off the products of inflammation and restore the tubes to their normal condition. This therapy is indicated in those cases where the cervix and uterus cannot be made responsible for the sterility and where bimanual examination shows no evidence of peritoneal involvement.

By this conservative treatment and by avoiding intrauterine manipulation we may overcome the injury to the cilia of the tubes and may prevent the extension of the inflammatory condition to the peritoneum and ovary. Even if no evidences of tubal, ovarian, or peritoneal inflammation can be made out by bimanual examination, and even if pain is not present, sterility must be referred to a salpingitis if the uterus is normally developed, if menstruation follows the normal course, if a dilatation of the cervix has been carried out so that obstruction by the external os, by the canal, by the internal os, or by acute anteflexion has been eliminated as the causal factor. In that event we must give to salpingitis of so mild a character as to simply injure the action of the cilia the blame for the sterility if active spermatozoa are present.

To show the varying opinions concerning sterility, I may mention that Reynolds believes that most cases of sterility are produced by abnormal genital secretion destructive to the spermatozoa. The vaginal secretions are normally acid and destroy pathogenic bacteria and also the spermatozoa. The effect on the spermatozoa is neutralized by the alkaline cervical secretion in coitus. Any excessive acidity kills the spermatozoa, hence a dearth of cervical secretion may be productive of sterility. On the other hand, the excessive cervical discharge due to congestion may, however, be cause of sterility. Abnormality of the ovaries or tubes, even when slight, causes sterility. Moderate enlargement of the ovaries with many persistent follicles causes a perverted physiologic condition. Infantile uterus is an absolute cause of sterility. Reynolds believes that drainage of the cervix should be assured and normal mucous membrane should be supplied, and the production of normal ova should be guaranteed and venous congestion should be removed, all of which are points concerning which there can be no difference of opinion.

The treatment of sterility is divided into (1) the treatment of those cases which have never been pregnant, and (2) the treatment of those cases which have aborted or have borne one or more children. In the former class of cases treatment is, of course, indicated only when the presence of active spermatozoa can be determined. For this purpose coitus, with the use of a condom, should be advised as late in the morning as possible, and this con-

dom with its contained spermatic fluid should be brought as soon as possible for microscopic examination. If spermatozoa of an active nature are present, treatment may be instituted.

In cases of *hypoplastic uteri* treatment is directed to stimulation and development of this organ. The general health of the patient should be looked after, salt baths or Nauheim baths should be given, outdoor exercise advised, and hot douches, consisting of several quarts of hot water, should be taken daily. For a long period ovarin, 3 to 5 grains three to five times a day, should be administered, combined with the sulphate of iron and arsen-hemol. In some instances good results have, it is claimed, followed the use of the cervical pessary, which stimulates the uterus to contraction and auto-massage. By others, the intrauterine application of electricity is lauded highly. (See pp. 127, 128.) In younger women this condition of hypoplasia often rights itself in the course of months and years, the outlook being most favorable in those cases in whom obesity, if present, diminishes, and in whom the ovaries evidence a functional capability, either by marked molimina menstrualia or by a fair amount of blood lost during the three to six days of the menstrual period. If a normally developed uterus and normally functionating ovaries are present, treatment should be directed to preserving the energy of the spermatozoa and to aiding their upward course to meet the ovum. With an acid pathologic vaginal, cervical, or uterine secretion, alkaline and normal saline douches should be used to avoid possible injury to the activity of the spermatozoa. Aside from this process, designed to make the vaginal canal innocuous, treatment must be directed to diminishing excessive or acrid discharge from the cervix or uterus which, by its character or copious quantity, may injure or sweep out the spermatozoa as they attempt to enter the uterine cavity. This purpose is best gained by the use of the method of treatment indicated under cervical catarrh and inflammatory endometritis. It implies the use of hot vaginal douches, the use of tincture of iodin for painting the vault of the vagina, the use of boroglycerin and gauze applied liberally about the cervix and to the vault of the vagina, and, in some cases, perhaps, it implies the use of intrauterine irrigation.

In some cases sterility seems to be due to marked *acute retro-*

flexion. If such be the case, the use of a Hodge or Smith pessary or, better still, an Alexander Adams operation, corrects the trouble, provided no tubal, ovarian, or peritoneal complications are present. Those who practise any of the intraperitoneal methods of operation, instead of the systematic use of the Alexander Adams operation, will bear witness to the frequency with which such retroflexions are found to show inflammatory involvement of the tubes and ovaries, with peritoneal adhesions which surround the ovaries or shut off the abdominal ends of the tubes.

Very acute anteflexion, if diagnosed as the cause of sterility, may be corrected by intrauterine stem pessary or by amputation of the cervix.

Obstruction by *stenosis of the cervix*, by a long narrow cervix, or by overgrown mucosa about the internal os demands dilatation of the cervix carried out between menstrual periods. This may be done under strictest aseptic precautions, in cases free of cervical and uterine catarrh, by gently dilating the cervix by applicators covered with cotton and dipped into lysol or sterile vaselin. After such treatments small wicks of iodoform gauze are introduced into the cervical canal and left in place for twenty-four hours. Regular dilatation by sounds or by intrauterine negative electrodes is also of aid. If a simple obstruction of this nature is the cause, treatment between several menstrual periods should result in pregnancy.

In the hands of some observers intrauterine stem pessaries worn for days or weeks have so removed the obstruction to the spermatozoa as to be subsequently followed by impregnation. By some the pessary is made of wire, so that during the period of its application access to the uterine cavity is furnished to the spermatozoa. In those cases in which, in addition to sterility, there is dysmenorrhea due to cervical obstruction or to very acute anteflexion, and in which the above-mentioned methods of treatment have failed to correct dysmenorrhea, a high amputation of the cervix at the level of the internal os is followed by cure of the dysmenorrhea and in some cases by impregnation. *On electricity*, see page 121.

In the hands of many men many cases of sterility have been cured by discission of the cervix and curettage. In some of these cases the result has been due to the dilatation of the cervix and to the removal of the overgrown mucosa at the level of the internal

os. In other cases the result has been due to restoration of a normal endometrium when hypersecretion from the uterus or atrophic or hypertrophic endometrium has prevented the embedding of the ovum or has resulted in its habitual early throwing off.

The majority of instances of primary sterility are due to *inflammatory involvements of the lining of the tube* or to inflammation which closes the outer end of the tubes. Of course, only in those conditions in which the outer end of the tube is open can we expect correction of the sterility by medical means. It is in this class of cases that curetting very often does harm, for it frequently results in the upward extension of a uterine inflammation or in the aggravation of an inflammation of the tube. This inflammatory extension often takes place after abortion and labor, and results in the so-called "one-child sterility." It certainly often occurs after the use of the curet or after intrauterine treatment. In many instances all the other possible causes of sterility except involvement of the tubal lining can be excluded. Hence, the treatment of these cases should be most conservative. Anything which improves the patient's general health will aid the system in finally overcoming the changes due to bacterial involvement and promises the best results. Local treatment should be confined to the use of vaginal douches, to the painting of the vault of the vagina with tincture of iodin, and to the use of large amounts of glycerin about the cervix, supplemented by the packing of the fornix and vagina with gauze. Work and marked effort should be prohibited. Hydrotherapy is of great aid. (See pages 118–121.) Coitus should be avoided as much as possible during treatment and rest should be enjoined during menstruation. These cases, just as they are greatest in number as the cause of sterility, of course furnish the greatest number of failures. The prognosis is best in those patients who have not been curetted, who are free of pain in the region of the tubes and ovaries, and who show on repeated bimanual examination no tangible alterations of these organs.

In the treatment of *sterility in which pregnancy once existed* and was interrupted by abortion, or in the many cases of "one-child sterility," there are a few instances in which overgrown endometrium or retained decidua obstructs the internal opening

of the Fallopian tubes and so prevents conception. In such instances, and in cases of hypertrophic or hyperplastic endometritis when inflammation can be absolutely excluded, curettage is indicated. However, the vast majority of such cases of acquired or secondary sterility are due to upward extension of a cervical or uterine inflammation which involves the tubes and ovaries in tangible or non-tangible inflammation. Such cases, as a rule, come to notice not because of the sterility, but because of the pain associated with varying degrees of oöphoritis, salpingo-oöphoritis, and pyosalpinx. The treatment of such cases is at first medical, local, and conservative, combined with the use of sitz-baths and Nauheim baths.

When all other causes can be excluded by examination and treatment, and primary or secondary sterility persists, when active spermatozoa are furnished by the male, we then come to the consideration of intra-abdominal operative treatment for the purpose of removing those peritoneal adhesions which cause an obstruction which prevents the ovum from entering the tubes. There are, however, among such cases many in which, even after loosening adhesions or opening the tube-ends, there is still left behind an altered inflamed mucosa in the tubes which will prevent the ovum from being carried into the uterus. The results of operation done for inflammatory disease which closes both tube-ends are not very encouraging. Most favorable are those cases in which a long period of rest and freedom from intrauterine treatment has followed the inflammatory cause of the primary or secondary sterility. Still more favorable are those cases in which there has been no bilateral or unilateral tubo-ovarian pain. When cases of this nature have gone for years without pain or have been treated conservatively, it may be taken for granted that the activity of the causal micro-organisms has ceased, that they have disappeared, and that the natural resistance of the patient has restored the tubal lining fairly to the normal. In such cases, when the facts are put before the patient and the great possibility of failure has been explained, an abdominal operation looking to the removal of adhesions and obstructions, to the cleansing of the tubes, and to the formation of large artificial ostia for the tubes, should be advised.

FREQUENCY OF MICTURITION; DYSURIA

Among the annoyances from which women suffer is frequency of urination, which, when marked and associated with severe contractions of the bladder, is called tenesmus vesicæ. The term dysuria is applied to the condition where urination is frequent and occurs even with little urine in the bladder, occurs also at night, and is accompanied by a sensation of discomfort and pain. The best and most logical study of the question is made by Winter, who looks at the condition with the same analytic eyes as is observed with dysmenorrhea. Hence the value of the term dysuria. There may be constant pain or discomfort in the bladder. Pain present before urination may be relieved when the bladder is emptied. Pain may be increased during urination. Pain may be felt most acutely when urination is completed.

Frequency of urination may be due to congestive, inflammatory, or productive alterations in the urethra, bladder, ureter, and kidney, which involve the lining, the wall, or parenchyma, or the covering of these organs. The diagnosis of the cause of frequent micturition and dysuria is made by inspection, by palpation, by a study of the secretion of the urethra, by examination of the urine, and by examination of the bladder with the cystoscope.

CAUSES

Urethritis.—An acute gonorrheal involvement of the urethra in the form of urethritis, especially if the inflammation involves the posterior urethra, is associated with frequency of urination, with burning micturition, and with a purulent secretion which may ofttimes be observed only on massaging the urethra. In the chronic form there may be localized or diffuse alterations of the urethra, of its lining, and of its follicles, which conditions are productive of frequent micturition, especially if they involve the posterior area. The urethrocystic junction may be involved by an acute or chronic alteration of inflammatory nature. This

condition is often mistaken for a cystitis. Especially is this the case with gonorrhea of the urethra. There are, however, many cases in which the urethrocystic junction is seen by the cystoscope to be congested and hyperemic, often as a result of a previous mild infection, but often without any further evidences of this cause. This is productive, in young girls and in younger women, of the condition known as irritable bladder.

In acute urethritis the external os is red and swollen. There is purulent discharge and the urethra, when examined through the vagina, feels thick and sensitive. Gonococci are readily found. The purulent secretion diminishes rapidly within a few days, gradually taking on a more epithelial nature, until finally in four to six weeks discharge disappears and the condition is apparently cured, though gonococci may be present for a long time. They are found by gently scraping the urethral canal with a small dull spatula. The secretion may continue for months or years, consisting mainly of epithelia. This is noted in chronic urethritis, in which condition there may be red spots about the external opening of the urethra, with involvement of the urethral glands of Skene or the periurethral glands. In other cases there is no discharge at all, but itching and burning are felt on urination. The sound shows the mucosa to be sensitive and its use produces the same sensation which the patient feels and complains of on urination. There is then either a diffuse involvement of the urethral wall or else circumscribed alterations about the lacunæ or about the glands of Littré.

In studying urethral alterations the color and the swelling of the urethral lining should be observed and the character of the external opening and the condition of the ducts should be noted. Palpation of the urethra is carried out by passing the finger into the vagina or by introducing the sound into the urethra or by the use of the endoscope. The sound shows the sensitiveness of the mucosa, the presence of irregularities, the existence of narrowing or of constrictions. The endoscope is needed only in those chronic cases with slight secretion, to reveal the location of circumscribed involvements and to diagnose the presence of polyps and tumors, especially if there is pain during urination. The examination of the urethral secretion should be done after massage of the urethra,

the massage being carried out several hours after urination. The examination of the urine in urethritis is needed only to exclude involvement of the bladder. For this purpose the patient should urinate a certain amount in order to clear the urethral canal, and the urine should then be drawn from the bladder by the use of the catheter.

Tumors of Urethra.—Under tumors of the urethra Winter understands all circumscribed swellings of the mucosa present in the urethra or projecting beyond the external opening. Prolapse of the urethra should be distinguished by the fact that the ducts of Skene are readily seen, and by the fact that by proper manipulation the mucosa which is prolapsed in its entire circumference or only on its posterior wall may be replaced within the canal. Condylomata may be present about the external opening of the urethra. There may be caruncles or polyps in the urethra. Caruncles are new formations growing out from the urethral mucosa and filled with numerous capillaries and very red in appearance. Some of them contain so many nerve filaments that the slightest touch causes exquisite pain. There may be a diffuse carcinomatous infiltration. These various forms of growth may produce marked cramp-like pains on urination, which sometimes extend into the vulva and anus and even into the hips. Sometimes they are associated with tenesmus of the sphincter ani.

Pericystic Conditions.—Conditions outside of the bladder are responsible for frequent urination and pains. A parametritic exudate may press against the bladder wall; the mucosa is arranged in thick folds in this area; the mucosa is edematous and is covered with minute vesicles—the so-called œdema bullosum of Kolischer. The same change is produced by some cases of pyosalpinx. Other diseases of the genitalia may produce annoyances in the bladder. The congestion induced by pregnancy plus the pressure of the pregnant uterus, the presence of small cervical or large uterine myomata, the existence of a retroflexion, various tumors of the adnexa, a large hematocele or a peritoneal exudate, have a congestive and pressure influence on the bladder. The bladder is involved by hyperemia in many cases of metritis, parametritis, and perimetritis. These conditions do not cause the pain noted in cystitis, but are responsible for frequent micturition.

Hyperemia of Bladder Mucosa.—In involvement of the bladder mucosa of a congestive hyperemic nature frequency of micturition results, more especially if the trigone or the urethrocystic junction is involved. This may be caused by drugs taken internally, by the irritating influence of certain articles of food, by inflammation about the bladder, by the pressure of exudates or tumors about the bladder, by masturbation, and by the congestion of menstruation and pregnancy. Hysteria and neurasthenia are conditions not infrequently associated with frequency of micturition. In the so-called "irritable bladder" there are congestive changes in the area of the trigone and especially at the urethrocystic junction. These points are very sensitive, and during the daytime, when the patient is in the standing position, urination is very frequent, but at night little or no annoyance may be felt. Many of these cases are probably the result of previous infections which leave behind only this congestive, hyperemic, sensitive alteration.

In that frequent form of bladder involvement which affects the trigone and which is known as hyperemia or a neurosis or irritable bladder, there is only a simple hyperemia of the trigone, as seen in pregnancy and pelvic disease, due to dilatation of the blood-vessels as the result of increased blood-supply in the pelvis. Hyperemia often disappears on removal of the cause, but chronic inflammation of the trigone not so easily. A distinction between a hyperemia and a real trigonitis is often difficult.

Cystitis.—The causes of cystitis are as follows: (1) Infection per urethram, such as cystitis gonorrhœica, the cystitis occurring post partum, and catheterization cystitis; (2) bacteria coming from the intestines, through the circulation or through the kidneys. Special forms are cystitis resulting through stone or neoplasms, and tubercular cystitis, descending from the kidney as a rule.

Bacteria of Cystitis.—True inflammation of the bladder is produced by bacteria introduced through the urethra or eliminated through the kidney, descending from the kidney in pyelitis, pyelonephritis, pyonephrosis, or tuberculosis. Bacterial infection is evidenced by the additional symptoms of pain and pyuria. Bacteria which may enter through the urethra are the bacterium coli, tubercle bacillus, the gonococcus, streptococcus, staphylococcus,

and yeasts. Bacteria may be introduced by the catheter, resulting in catheterization cystitis. Bacteria, however, may enter, and frequently do so, without this mechanical aid, as can be seen from the extension of a gonorrheal urethritis. This bladder involvement per urethram not infrequently takes place with profuse pathologic discharge from the vagina, cervix, and uterus. The bacterium coli, especially in older women with lacerations of the perineum and uncleanly personal care, comes directly from the rectum. Involvement of the bladder by the colon bacillus is not rare in older women, and is comparable to senile vaginitis, where tissues of little resistance permit of bacterial invasion and growth.

Alterations in the Mucosa in Acute Cystitis.—Seen through the cystoscope, the normal mucosa of the bladder is very pale in color. There is a slight yellowish-rose tint. There are numerous delicate vessels which in various spots resemble a picture of the retina. In inflammation the mucosa is redder than normal. There is a diffuse capillary injection and an increase and dilatation of the larger vessels. These changes diminish the extent of the normal pale area of the mucosa.

In acute cystitis there is a strong vascularization and filling of the vessels, especially near the neck of the bladder and in the trigone. The mucous membrane is edematous, hyperemic, and shows ecchymoses. The epithelia become destroyed and are mixed with the urine. In severe cases there is small-celled infiltration of the mucosa and the muscularis.

At various points the mucosa is red in spots or in larger areas. At those points where purulent exudate or tumors compress the bladder wall the small vesicles described by Kolischer are present. According to Kolischer, gonorrheal inflammation of the bladder shows numerous inflamed red spots, about which the bladder mucosa seems normal. In inflammation of the bladder much of the mucosa may be covered by attached mucus.

In severe cases, especially with gonorrhea and tuberculosis, ulcerations may be present. Tuberculosis of the bladder occurring from infection of the kidney shows most marked involvement in the neighborhood of the ureter. There may be miliary nodules grouped together and surrounded by areas of injection. There may be ulcerations of small character or there may be a large area

of ulceration, especially marked around the opening of the ureters. The cystoscope divulges congestion of the mucosa, roughening of the mucosa, edema of the mucosa, the presence of vesicles, tubercles, and ulcerations.

Gonorrheal Cystitis.—Gonorrheal cystitis appears under the form of cystitis colli. There is frequent desire for urination and very severe pain, especially at the end of urination. Pus and also blood are in the urine. Frequency of urination is more marked than in all other acute forms and may occur every five or ten minutes.

Acute gonorrheal cystitis is either catarrhal or purulent. The catarrhal form produces an acid urine containing mucus, large bladder epithelia, and many micro-organisms. The urine of the acute purulent form has a neutral or alkaline reaction, contains pus cells, numerous micro-organisms, and many bladder epithelia. If alkaline, the urine may have a foul smell.

The chronic form results subsequent to an acute infection and may present objective evidences of the above nature with but few subjective evidences. In the alkaline form the urine should be kept acid by the administration of salicylic acid.

Gonorrheal urethrocystitis causes frequent micturition, worse by day. The second urine is much clearer and the urine is acid. Colon bacilli may produce a pyelitis without apparent cause after marriage from lesions to the hymen. In certain cases each time after coitus, especially with vaginismus, or with senile atrophy of the vagina there occurs a cystitis with possible secondary colipyelitis. When the attempts at coitus are avoided the condition improves.

Idiopathic Cystitis.—So-called idiopathic cystitis occurs readily in women because the short urethra allows bacteria to enter the bladder, especially in association with pregnancy and post partum. The diagnosis between cystitis and pyelitis is made partly by the therapy. Every cystitis except the tubercular form and the form associated with malignant growths improves by treatment of the bladder, whereas pyelitis does not. The characteristics of so-called "idiopathic cystitis" are the same as in the following form.

Catheterization Cystitis.—Catheterization cystitis is not infrequent after labor and operation. The urine is cloudy, con-

tains pus cells, numerous bacteria, and mucus, and frequently undergoes ammoniacal degeneration. Normal urine is slightly acid, ammoniacal urine is alkaline. The colon bacillus does not cause ammoniacal degeneration, hence the reaction of the urine in colon bacillus cystitis is acid. The same is true, as a rule, of the gonococcus form of chronic cystitis. In tubercular cystitis the urine is also acid. The various forms of staphylococci are the cocci generally responsible for ammoniacal degeneration of the urine. In addition, this condition is caused by the proteus vulgaris of Hauser.

Alterations in Chronic Cystitis.—In the chronic cases the main changes are in the trigone and at the neck of the bladder. The mucous membrane is gray, swollen, thickened, succulent. Epithelium is gone in the upper layers and there is round-celled infiltration in the submucosa. There may be seen typical granulations or more marked round excrescences, or else villous outgrowths. In extremely severe cases ulcerations may occur.

In very chronic cases the bladder wall, instead of being up to 10 mm. in thickness, is often 2 to 3 cm. thick. The bladder wall shows changes in the interstitial tissue, which is increased. This condition constitutes a fibrosis, according to Garceau. In the earlier stages there is total or partial desquamation of the epithelium, and later on the whole internal coat is cast off, leaving only a connective-tissue lining. Sometimes the epithelium instead of being cast off proliferates, forming patches of leukoplakia or papillary glandular plaques giving the trigone and vesical neck a villous, velvety look. Occasionally small cysts are formed. If necrosis of the superficial layers takes place, we have a membranous cystitis. The commonest lesion is hypertrophy of the muscle wall.

Trigonitis.—A frequent form of cystitis is that which affects the trigone, and is often called hyperemia or irritable bladder. There is frequently a simple hyperemia of the trigone, seen in pregnancy and pelvic diseases, due to dilatation of the blood-vessels as the result of increased blood-supply in the pelvis. Hyperemia often disappears on removal of the cause, but chronic inflammation of the trigone not so easily. A distinction between a hyperemia and trigonitis is often difficult. In severe cases not only the trigone, but the vesical neck and the urethra, have a characteristic scarlet

red appearance. The urine is not much altered in these cases, but careful examination shows excess of epithelial cells, some blood and pus, and various bacteria. Two-thirds of the bladder involvements in women are this chronic inflammatory trigonitis. In the later stages there may be proliferative processes leading to the formation of papillary or warty excrescences, which show marked round-celled infiltration and change of the cylindric epithelium to squamous.

Trigonitis, Irritable Bladder.—As "irritable bladder" we consider the cases of hypersensitiveness for which a tangible or gross cause cannot be found. Many authorities substitute the phrase cystitis coli, or trigoni, for the phrase "irritable bladder." In hysteric and neurasthenic people, more so than in healthy people, increased frequency of urination results from psychic excitement. Irritable bladder has two groups of causes: (1) Any changes on the part of the genitalia or the pelvic organs which may be brought into etiologic relationship with the hyperemia or congestion at the base of the bladder; (2) organic or functional nerve diseases. The often-discovered dark color of the trigone points toward general hyperemia of the pelvis. In chronic cases there is desquamation of the thickened epithelium. Occasionally the hyperemia seems to be the remnant of a chronic cystitis. In vaginal and abdominal operations it may be seen that the tremendously dilated veins of the pelvic connective tissue, and in the neighborhood of the bladder, are often developed to a great degree. Thus venous hyperemia is not always a simple congestion. There is often a development and dilatation of the venous vessels which remain as a residuum of pregnancy, just as in subinvolution we find an enlarged uterus with congestion, etc., without there being real inflammation.

A hyperemia of the trigone is often associated with the changes in the entire venous system of the pelvis. It is not associated with or caused by just simple changed position of the uterus.

Before and during a period there is hyperemia of the bladder, especially of the base and the trigone. All acute cases of cystitis become worse during a period, and even tend to develop during a period, and in the chronic form are very often worse during the period. The same annoyances are accentuated in those cases

where there is chronic congestion with or without dilated veins. In the earlier stages of pregnancy, before any pressure is possible on the part of the uterus, there is an active hyperemia of the bladder. After labor the cystoscope shows that with a long duration of labor there is mechanical injury to the bladder mucosa. Associated with this, there is of course stretching of the bladder base, and injury to the veins about it may be pronounced. There may result a subinvolution of the bladder and a permanent stasis in the dilated veins. This hypotonus of the bladder may last a long time or may be permanent. Severe annoyances may result from a retroflexion of a gravid uterus, if the retroflexion is not corrected, and if the pregnant uterus becomes incarcerated. In the vast majority of instances there occurs, without symptoms, a spontaneous correction of the retroflexion.

There is, therefore, often found in the uterovaginal plexus and uterovesical and in the pampiniform plexus decided varicose dilatation of the veins. Through the slight development of valves changeable degrees of dilatation are produced by sexual excitement, especially if not gratified, menstruation, position of the uterus, subinvolution, etc., which may cause, in addition to vesical annoyances, many backaches heretofore not explained. In some cases there may result a varicocele; the same may happen in the region of the trigone.

Shrunken Bladder.—In the chronic forms, resulting from neglected uncured cases of cystitis, there may be huge muscular hypertrophy of the bladder wall. The hypertrophy of the wall results in diminution of the cavity of the bladder; the bladder holds little urine and is much contracted, so that the capacity is limited to 100 grams or less. This is the "shrunken bladder," which must be treated by gradual repeated distention.

Pyelitis.—The etiology of cystitis, with the exception of the form caused by the catheter, is not understood. In the vast majority of cases the cause is due to the bacterium coli. But how they enter into the bladder is not distinctly known. Still more uncertain is the etiology of pyelitis in which the bacterium coli is present in 95 per cent. of the cases. There has been a division into two forms, the ascending and the descending. At present the majority believe in a descending primarily hema-

togenous path. A primary pyelitis may occur in pregnancy, which is caused or furthered by the pregnancy. If these cases are examined by the cystoscope early enough the bladder is seen to be normal, and pus is seen coming out of the ureters, which speaks for a primary involvement of the kidneys. The course in pregnancy is characterized by attacks, remissions, and relapses. The fever may be of various degrees, may be continuous, intermittent, remittent, with chills, the pulse corresponds to the temperature, the general condition is disturbed, there is fatigue, headache, nausea. The most important sign is pain in the region of the kidneys, usually on the right side. The pain often radiates along the ureters, *but the region of the bladder is scarcely ever tender*. The pain my radiate into the thighs, into the back, and toward the shoulders. Some cases are so mild that they are overlooked. Examination of the specimen must be made frequently. Many cases of "pregnancy fever" are due to this condition. As an accompaniment of the hidden or latent type we must reckon the nausea and vomiting that sometimes occur in the latter months.

The duration of an attack of pyelitis is, in most cases, about a week; in some instances the fever lasts only two days, and in severe cases, with numerous chills, it may last a month. There are many cases in which the specimen does not change and the condition continues up to and after labor, and there is always danger of a new attack of fever. The recurrent attacks, whether before labor or after, are rarely as bad as the first one. In many instances the specimen becomes normal, and there is not the least sign of the disease. These cases are not to be considered cured; they simply *seem* cured. In children cystitis is very frequent, more frequent in girls. Very frequently the *whole* urinary tract is involved and it is not a simple cystitis. It is said that from 1 to 2 per cent. of children are affected. Among those children where the bladder and the kidney pelvis are affected 98 per cent. are girls. The most frequent age is from the first to the third year. Therefore, among children there is a malproportion in favor of the girls; the condition lasts often a long time, and is ten times as frequent as in adults. The conclusion seems, according to Kermauner, to be reached that there is no "pyelo-

nephritis of pregnancy," that it is only a relapse of a latent, symptomless, unrecognized disease which has been lasting for years or for decades since childhood.

As regards cystitis in pregnancy, experiments have shown that the bacterium coli may remain in or inhabit the bladder and the urethra and pelvis of the kidney and may increase. This is a condition which is not so, or does not hold good for streptococci, and not very much for staphylococci. The bacterium coli is a constant inhabitant of the urethra in pregnancy. The light forms of pyelitis have no characteristic symptoms. Even severe forms may develop without a special characteristic picture. When general symptoms develop they are of a septic nature. Important among symptoms is the spontaneous sensitiveness to pain pressure, in the region of the kidney, and the finally increased resistance in that region and the change in the urine. The urine in acute cases is cloudy, contains mucus and pus, epithelia and bacteria. The reaction is acid, and the microscopic findings in pyelitis are not characteristic for the diagnosis as against cystitis. Occasionally there are a few cylinders. On the right side many an appendix has been removed when the condition was really a pyelitis. In some cases the bladder symptoms predominate. In one-fourth of the cases which are finally recognized as pyelitis, by use of the ureter catheter, nothing points toward the kidney and the ureter. There are no symptoms except the character of the urine and the bladder symptoms. From the complaints of the patient, and from the character of the urine, a cystitis is diagnosed. A very important therapeutic measure consists, in many cases, in laying the patient on the sound side.

Tuberculosis.—Primary tuberculosis of the bladder is doubtful. It is a question whether tuberculosis is really ever primary in the bladder. In the opinion of Garceau, it is practically always secondary to some lesion situated elsewhere in the body which serves as a primary focus. It is usually secondary to tuberculosis of the kidney. Clinically, however, there are many cases in which the bladder lesion is the only important one. Vesical tuberculosis is first miliary in form; second, ulcerative. In the miliary form the cystoscope shows numbers of small red patches in which the

tubercles are later to appear. In the early stage there are small gray nodules, sometimes isolated, sometimes grouped, giving the impression of follicles. Inflammatory reaction results and the tubercles undergo degeneration, become soft, and there finally results ulceration. Around the ulcerations there are inflammatory areas. There is much vascularization and ecchymosis. In advanced cases the process goes deeper than the surface, the bladder muscle is thickened and shrunken, and the lumen of the bladder is much diminished. The various stages are gray nodules, yellow nodules, small areas of softening, larger confluent ulcers, secondary inflammation of the mucosa and muscularis. As almost all cases are of the descending form, the earliest nodules are seen near the openings of the ureters. Later on the condition becomes more general. The trigone, the area from the ureters to the neck of the bladder, is the favorite point of location, although tubercular areas may occur elsewhere.

Stone and Neoplasm.—Stone in the bladder in women is rare. The proportion of women affected compared with men is 1 to 200. Foreign bodies in the bladder may be introduced in attempts at masturbation. Tumors of the bladder occur most often in the neighborhood of the ureters and near the internal sphincter.

DIAGNOSIS

The three important symptoms of cystitis are: (1) Frequency of urination; (2) pain; and (3) pus in the urine. The more acute the process, the more marked are the first two symptoms.

The normal bladder feels the desire to be emptied when between 300 and 500 c.c. are present. In cystitis frequency of urination exists with small amounts of urine in the bladder. This desire exists by day and by night. In the nervous form of frequent urination there is little or no annoyance at night.

Pain.—In cystitis pain may occur before, during, or after urination. In acute cases the pain lessens as soon as the bladder is empty. In many cases, especially if the lesion is near the neck of the bladder, the pain is felt at the end of urination.

In discussing the pain associated with urethral or bladder conditions we find that pain may come on during urination, may

become worse on urination, may be relieved on urination, or may be felt most markedly after the bladder is emptied. Constant pain means a cystitis and perhaps a pericystitis. Pain present before urination and which is relieved by urination is due to the bladder. Pain made worse during urination is due to urethral causes. Pain felt most after urination is completed is probably due to pelvic peritonitis and adhesions to the bladder which are made tense by contraction of the bladder.

Purulent Urine.—There are, as stated, very slight forms of inflammation with hyperemia of the mucosa in which there is no pus. As a rule, there is no cystitis without pus in the urine.

The last urine passed contains the most pus. The more diffuse the process, the greater the amount of pus. Blood in general is not a constant symptom of cystitis. In diagnosing involvements of the bladder, examination of the urine is of importance. The urine should be withdrawn by the catheter and allowed to stand in a urine glass for several hours, or, better still, should be centrifuged. The best procedure is to centrifuge a large amount of urine. The sediment should be examined. If the sediment does not dissolve on heating a specimen of urine or on the addition of acetic acid, it is composed of pus or epithelium or blood or bacteria, or combinations of these elements. If it is increased by heating and does not disappear on the addition of nitric acid, we have the usual test for albumin. The microscope aids in the finding of pus cells, of epithelia, of blood, of bacteria, and of urine crystals. The bacteria most sought for are the gonococci and the tubercle bacilli.

Continued purulent discharge from the bladder which resists treatment, especially if there is pain in the region of the kidney, demands careful microscopic examination, a staining for tubercle bacilli, and the use of the cystoscope for the purpose of catheterizing the ureters.

Chronic cystitis is the most frequent cause of dysuria. Whenever the urine, in any but an acute cystitis, contains much pus, the cystoscope should be used with or without catheterization of the ureters. Blood may be present in acute cystitis mixed with pus. In other conditions, especially if there is blood without the

presence of pus, a severe affection or new-growth of the bladder or kidney is probable.

If none of the above causes are present, and if diseases of the ureter, the pelvis of the kidney, and the kidney itself can be excluded, we may come to the conclusion that frequency of micturition is due to a general or a local neurosis or to "irritable bladder."

The retroflexion of a gravid uterus may bend the urethra, compress it against the symphysis, and result in a tremendously dilated bladder, from which the urine dribbles. Infection of such a bladder may cause a necrosis of the mucosa.

SYMPTOMS OF TUBERCULAR CYSTITIS

In the early stages when the process descends from the kidneys, there is increased frequency of urination and perhaps bleeding. Frequency of urination is not very great and pain is slight. The urine in this period is very clear, but at times there may occur bleedings of short duration, and usually at the end of urination and not affected by activity or rest.

When in the course of a few months around the circumscribed areas there develops a tubercular cystitis, there is frequency of urination, pain on urination, and pus is sometimes found in the urine. The frequency of urination is very marked and is uninfluenced by treatment, especially if the condition has advanced over the trigone to the neck of the bladder. Urination is then accompanied by pain at the end of micturition. The bladder contracts in tenesmus. The urine is acid (which is also true of most forms of cystitis).

Tuberculosis of the bladder is generally secondary to tuberculosis of the kidneys and ureters. The cystoscope shows tubercles and ulcerations. Miliary tubercles may be present in the base of the bladder, about the ureters, or diffusely scattered. There is frequency of micturition at night. Pain comes on gradually and is noted in urination or may be more or less steady. When cheesy degeneration of the tubercles occurs, pus appears. The symptoms are those of a chronic cystitis.

The amount of pus is fairly large, for, in addition to the localized processes, the entire bladder is inflamed. The occurrence of blood, even if only in the form of red blood-cells recognized by the

microscope, is almost always noticed in tuberculosis. The tubercle bacilli can be found in 80 per cent. of the cases and must be distinguished from the smegma bacilli.

Tuberculosis should always be suspected, especially in younger women if other causes are absent. There is frequency of urination, pyuria, pain on pressure and examination. The tubercle bacilli should be looked for. The cystoscope should be used and guinea-pigs should be inoculated. According to Kolischer, urinary tuberculosis is a disease of young adult women, generally occurring in the kidney primarily, and unilateral. Bladder symptoms are the first cause of complaint. The kidney involvement must be diagnosed from appendicitis and gall-stone colic. In about half the cases heredity is concerned in the etiology.

In those cases in which tubercle bacilli cannot be found the fact that other bacteria are not present is of importance. Tuberculous urine in which no tubercle bacilli are found is characterized by the fact that, not always but very often, no other bacteria are present. In contrast with other forms of cystitis, no etiology is evident. The pain is generally excessive. The bladder is intolerant of large amounts of fluid injected. If cystitis therapy does not improve a bladder disease, tuberculosis is to be suspected. A condition of "cystitis" which does not improve under nitrate of silver, but which grows worse, is either tuberculous cystitis or pyelitis. The cystoscope is essential to the making of the diagnosis in doubtful cases.

TREATMENT OF CYSTITIS

Acute cystitis should be treated by the internal administration of salicylic acid or salicylate of soda, or salol 5 grains every three hours. The use of salol results in the liberation of carbolic acid and salicylic acid in the urine. Urotropin is a very valuable urinary antiseptic, especially as an adjunct to salol in dose of 5 grains every three hours. It is of great importance in the chronic forms. Helmitol, 15 grains three times a day, gives off more formaldehyd in the urine than does urotropin and acts even if the urine is not acid. Saliformin, 5 grains every four hours, is a valuable urinary antiseptic. A favorable combination consists of sodium salicylate, 1 dram; urotropin, 1½ drams; tincture of

hyoscyamus, 4 drams; elixir simplex, q. s. ad. 4 ounces; 1 dram of this mixture being given in water several times a day. Benzoic acid, 10 grains three times a day, in capsules, checks fermentation and is a local alterative and antiseptic. It acts well in gonorrhea and especially well in ammoniacal cystitis. Methyl-blue, 5 grains several times a day in capsules, is only mildly antiseptic, but is of aid in the non-gonorrheal forms.

℞. Acidi benzoic..... ℥j
Syrup. aurant. cort..... ℥v
Aq. destil..... ℥viij
S.—One tablespoon every two hours.

℞. Acidi salicyl..... ℥iv
Div. in dos. xii.
S.—One powder t. i. d. with water.

℞. Sodii salicylatis..... ℥iss
Urotropin..... ℥iss
Tinct. hyoscyam..... ℥iv
Elixir simplex, q. s. ad..... ℥iv
S.— ℥j in water every two hours.

℞. Salol..... gr. v
Urotropin..... gr. v
Ft. tal. caps. no. xii.
S.—One every four hours with water.

The pain associated with acute cystitis may be relieved by a suppository containing 1 grain of extract of opium and 1 grain of extract of hyoscyamus in ol. theobroma. If this does not relieve the pain and spasm, morphin must be given by the needle. The fluidextract of uva ursi, 2 drams three times a day, is a slight stimulant and astringent and is of value in the early stages. The fluidextract of kava-kava, ½ dram three times a day, is highly comforting, especially in gonorrheal cystitis. In the later stages we may use t. i. d. gonosan capsules which contain 20 per cent. of kava and 80 per cent. of sandalwood oil. Balsam of copaiba, 15 grains in capsules, is a local stimulant to the mucous membrane.

℞. Ext. opii..... gr. v
Ext. hyoscyam..... gr. v
Ol. theobrom. q. s.
F. suppositor. rectal. no. v.
S.—One morning and night for pain.

℞. Ext. cannab. ind..... gr. v
Ext. hyoscyam..... gr. v
Sacch. lactis..... ℥j
M. f. pulv. Div. in dos. x.
S.—Three to five powders daily for pain.

℞. Syr. papaveris..... ℥iss
Infus. fol. uvæ ursi..... ℥xij
S.—One tablespoon every one or two hours for pain. (Finger.)

Among the other drugs taken internally are the alkalies, which should be given in gonorrheal cystitis only if the urine is very acid, and never enough to render the urine alkaline. The best of the alkalies is citrate of potash. This may be prescribed in the form of:

℞. Liquor potassii citratis..... ℥vj
S.—One tablespoon every two hours.

Or:

℞. Potassii citras effervescens..... ℥iij
S.— ℥ss in water every two hours.

The bottled waters of Giesshübl and Wildungen may be used; or:

℞. Potass. bicarb..... ℥j
Tr. hyoscyam.
Ext. kav. kav. fl.....āā ℥ss
Aq..... ℥viij
S.— ℥ss two hours after meals.

The alkalies are of value in some cases of acid cystitis, and in those cases of irritable bladder which are associated with acid urine. They should be used in gonorrheal cystitis only to diminish very marked acidity.

The local treatment of acute gonorrheal cystitis applies to acute cystitis due to other bacteria as well. A preliminary washing of the bladder is of value to remove pus and bacteria. Normal salt solution, 2 drams of salt to the quart, or a mild boracic solution, 1 per cent., are used for the preliminary washing, either of which fluids have a non-irritating influence on the mucous membrane. The preliminary irrigation should be followed by irrigation with fluids which have a destructive action on the bacteria and which exert a stimulative influence on the epithelium, and so aid in the throwing off of bacteria. Protargol, while not quite so valuable in this respect as silver, is much less irritating and should be used in the acute stages. Protargol works well in the diluted strength of 1 : 800 up to 1 : 100 in the acute stages, and from 1 to 5 per cent. in the more stubborn cases. Several ounces are to be injected into the bladder and allowed to remain for five to ten minutes. If the bladder is extremely sensitive, it should be first anesthetized by injecting into the bladder an ounce of a 1 per cent. solution of eucain or of a 4 per cent. solution of antipyrin, which should be left in place for several minutes. In the subacute stages or in

stubborn cases nitrate of silver diminishes congestion and stimulates regeneration, as well as being a very valuable germicide. When used in solutions of 1 : 10,000 and gradually increased to 1 : 500, and in very stubborn cases even 1 : 100, it renders the urine clear. If too annoying, it should be preceded by the use of an anesthetizing solution. The strength of any of the irrigations depends upon the sensitiveness of the bladder, which can be judged by the preliminary washing with saline or boracic solution and by the amount which the bladder can hold when this preliminary solution is injected (Fig. 32).

In the milder stages, cystitis may be treated by irrigation with 0.5 per cent. salicylic solution or by 2 per cent. resorcin solution, which are mildly germicidal. Permanganate of potash is an antiseptic of value and may be used in the strength of 1 : 10,000. Ichthyol 1 per cent., when allowed to remain in the bladder for fifteen minutes, is an excellent drug.

In chronic cystitis nitrate of silver 1 : 3000 or 1 : 500 should be used every other day. The stronger solutions or instillations must be preceded by an anesthetizing irrigation.

In chronic cystitis urotropin has a splendid effect. While urotropin, salol, and helmitol (helmitol acts in an alkaline urine) are splendid urinary antiseptics, yet in many of the cases of chronic cystitis with acid urine the urine must be rendered less acid or else alkaline.

Cases of chronic cystitis with shrunken bladder must, in addition to the use of silver, etc., be treated two or three times a week by the injection of boracic solution under the pressure of a syringe up to the full capacity of the bladder. At each successive treatment more should be injected, so that in the course of weeks or months the capacity of the bladder is increased. These are cases of old, long-neglected cystitis with marked hypertrophy of the bladder wall. Treatment of such cases takes months or years. General tonic treatment, rest, and plenty of fresh air are essential in benefiting many cases of chronic cystitis.

There are many cases of so-called irritable bladder where examination with the cystoscope shows the involvement to be limited to the area of the trigone. Those cases in which there is simply a slight hyperemia of this area, or of the urethrocystic junction,

belong to the class known as irritable bladder. In many of these cases, however, the lesions in the area of the trigone are more marked, and interstitial or productive changes are present. These cases of "trigonitis" are usually the result of old neglected cases of gonorrheal or other forms of cystitis. In the treatment of such cases the various silver salts give the best results.

The treatment of simple "irritable bladder" is as follows: The bladder is thoroughly irrigated with a strong solution of boracic acid through a catheter. After irrigation with boracic acid solution the bladder is then emptied and 8 ounces of a 1 per cent. watery solution of ichthyol are introduced, which the patient is to retain for one-half hour, if possible. This treatment is continued every other day. If this fails mild solutions of silver nitrate must be used. For internal medication I prefer seven grains of urotropin four times daily, or else, with very acid urine, citrate of potash several times daily. In the milder forms of irritable bladder Wildungen water without local treatment arrests the acidity of the urine.

In every case with symptoms of cystitis disease of the kidneys should be excluded. In cystitis of uncertain etiology any urine which, in spite of treatment, shows pus or blood should be examined for tubercle bacilli. Pus in the urine without the finding of the usual pus micro-organisms speaks strongly for tuberculosis. In the treatment of vesical tuberculosis removal of the diseased kidney is an important factor and subsequent treatment of the bladder is most essential. In addition to relieving the patient of the dangers and tremendous annoyance of vesical tuberculosis, it must be borne in mind that the ureter of the sound side may become involved by upward progress of the tubercular process from the bladder. According to Klotz, Rovsing treats tuberculosis of the bladder as follows: The bladder is first irrigated and then 50 c.c. of warm 5 per cent. solution of carbolic acid is injected and allowed to remain for three or four minutes. If it returns turbid, the method is repeated until it returns clear. A rectal suppository containing ½ to 1 grain of ext. opii is introduced to lessen the pain which occurs two or three hours after the treatment. The treatment is repeated every other day until the urine remains fairly clear between treatments, and then the interval is gradually

lengthened. Treatment lasts from one to six months. Often no benefit is obtained from treatment unless the diseased kidney is removed. To determine which kidney is involved, catheterization of the ureters is necessary.

According to the experience of Guyon and Casper, instillations of corrosive sublimate are used in the bladder twice a week, or even every day if possible, for the treatment of tuberculosis of the bladder. Thirty drops are introduced into the bladder by a long pipet, beginning with a solution 1 : 20,000 to 1 : 10,000 and gradually increasing the strength to 1 : 500, which is rarely possible. To avoid marked pain, eucain and cocain should be used before the instillation of corrosive sublimate.

In every case of possible tuberculosis, especially if the cystoscope is not used or when the cystoscope shows the bladder to be sound, a specimen of urine should be drawn from the bladder by catheter under aseptic precautions and sent to a pathologist for guinea-pig inoculation, even though it takes five weeks to receive a report.

In the treatment of those cases of irritable bladder due to or associated with pelvic inflammation or uterine displacements, the bladder should be treated as described above, and ofttimes with good results. In some instances, however, no improvement of permanent nature results without treatment and medical or surgical correction of the pelvic disease. In the treatment of irritable bladder, due to a general nervous condition or to hysteria, the use of alkalies to combat the acidity of the urine, and general treatment for the condition, are the modes of procedure.

For the treatment of urethritis see Gonorrheal Urethritis, p. 484.

In the treatment of those conditions of the urethra involving productive changes, such as caruncles, polyps, etc., their removal by cautery or knife is the proper treatment. Local treatment by ichthyol, silver salts, by urethral irrigation, or the use of medicated pencils ofttimes brings relief (page 488).

ASSOCIATED NERVOUS CONDITIONS IN GYNECOLOGY

PUBERTY

Constitutional Changes Produced by the Ovaries.—Marked constitutional changes occur at puberty, during menstruation, during pregnancy, and at the menopause. The relation between the changes occurring at puberty and at the menopause, before menstruation, and after menstruation, during pregnancy and after pregnancy, show a decided resemblance. Until shortly before each menstrual period, temperature, pulse, muscular activity, lung capacity, and the excretion of urea increase, and reach their maximum two or three days before the appearance of blood. During this period we find hyperemia, edema, increased activity of the ovary, changes in all the mucous membranes, and increased function of all the glandular apparatus. These and the occurrence of swelling of the breasts, tenderness of the abdomen, even pain, and the passage from the vagina of greater amounts of mucus, sometimes mixed with blood, prove at the beginning of each menstrual period a wave movement and increased general blood-tension due to the ovaries and their secretion. During and after menstruation regressive changes are evident.

During pregnancy we have an increased amount of the watery elements of the blood, an increased proportion of fibrin, a diminished amount of albumin, an increase in the white blood-cells, a relative diminution in the number of red blood-cells and in the amount of hemoglobin.

Before labor the temperature is higher in the last three months of pregnancy, and there is an increase in the elements of the body, equal to one-thirteenth of the body-weight. This increase is due in part to serous infiltration, and to the increased ability of the body to form organized tissue. Post partum, after a temporarily short rise, the temperature is lower, the blood-pressure sinks, and becomes normal on the ninth day. After labor there is a diminution of tissue change and a diminution in the amount of urine.

As regards temperature, blood-pressure, hyperemia, the amount of urine secreted, etc., there is always a similar increase before menstruation, and a like decrease in intensity during and after menstruation, as during and after parturition, so that Virchow has well characterized menstruation as a *labor en miniature.*

NERVOUS SYMPTOMS AT PUBERTY

There is marked development at puberty in the female, which occurs earlier than in the male. This period, from the thirteenth to eighteenth years, is a trying one for the girl, and is characterized by diminished general resistance. The increased blood-supply in the genital area, and the increased arterial tension produced by the ovaries and their internal secretion, cause at puberty backache, a sense of drawing in the back, sensations of pressure in the pelvis and in the region of the uterus and ovaries. There is a feeling of weight and weariness in the lower extremities. Girls may become suddenly pale or red, alternately hot and cold. There is sometimes a slight rise in temperature. There are changes in the activity of the intestines, bladder, and stomach. Most marked is an irritability of the nervous system. There is a tendency to depression and "blues." The nervous system is often affected even before the establishment of menstruation, and among the symptoms may be headache, lassitude, irritability, rings under the eyes, general discomfort, epigastric pain, loss of appetite, palpitation of the heart, dizziness, weakness, and weight in the lower extremities. All this may last for months and may weaken the general system and diminish its resistance.

Among the prodromal symptoms are swelling of the breasts, meteorismus, watery, mucoid vaginal discharge, pruritus vulvæ. Any or all of the above symptoms may be magnified in any case and result in severe abdominal pain, in general weakness, marked dyspnea, diarrhea, headache, neuralgia. They are due to the menstrual stimulus produced by the functionating ovaries which are bringing follicles to full development and are producing a general constitutional hyperemia. During this period the relation between the ovary and other organs, especially the thyroid gland, is being worked out either easily and harmoniously, or with marked difficulty.

Cardiac Symptoms at Puberty.—Among the cardiac symptoms noted at puberty is nervous heart palpitation, often in girls who are not anemic and who have no disease of the heart or the vessels. It is related to the changes occurring in the genital sphere because it comes on with force a few weeks or months before the establishment of menstruation, occurs irregularly, lasts beyond the first menstruation, but disappears when regular menstruation is finally established. It is of four forms and is probably related in part to thyroid overactivity.

In the first, the pulse is rapid—between 120 and 140. It comes on at irregular intervals without cause or after slight excitement.

The second form shows a tachycardia, very rapid; it is premenstrual and comes on before the establishment of the first menstruation, but recurs regularly every three or four weeks before menstruation or during the menstrual period and lasts but a few days.

In the third form the condition is noted in girls in whom menstruation begins late, at eighteen, nineteen, or twenty, or in girls in whom there is irregularity of menstruation. Here the cardiac symptoms are sometimes marked. There is a decided and frequent palpitation and throbbing in the carotids. The skin is pale, there is diminished hemoglobin, there is asthenia, and nervousness. We have the picture of the chlorotic habit, often combined with evidences of the anemic form of lipomatosis universalis. There is often acne vulgaris, comedones, sweating of the hands, blueness of the nose and ears.

The fourth form is noted in girls who grow rapidly before the first establishment of menstruation. They are not anemic or nervous, but are usually very thin. There is palpitation, shortness of breath when active. The heart, in contradistinction to the other three forms, shows enlargement, and there is hypertrophy especially of the left ventricle. Here development in the genital sphere has caused a storm in the vessel system which produces increased resistance to the work of the heart; the rapid growth of the body increases the heart's work. Corsets create frequently an obstacle to the development of the rapidly growing body, the thorax, the breasts, and the upper abdomen, and add to the burden placed upon the heart (Kisch).

The Influence of Psychic Stimuli at Puberty.—The above changes are accentuated by processes going on in the psyche. The child observes changes in her form and outline, observes external evidences of puberty, is subject to psychic stimuli, all of which affect the general nervous system. The degree and character of the influence exerted from the genitalia depend on the resistance of the nervous system, or on the temperament, hereditary constitution, education, and training. In children of families characterized by irritable excitability, in children in large cities, in children who work hard at school and high school, in children who early become cognizant of genito-sexual matters, in girls whose thoughts have been directed into abnormal channels by other children, all the changes occurring at the establishment of menstruation work with greater intensity and with manifold variations.

The immediate surroundings in which a young girl lives during her sexual development all have an influence. In the families of working-girls there is often too much physical labor, poor nutrition, work involving the use of the lower extremities, and often early sexual stimulation. In the country, on the other hand, the girls develop gradually and normally in surroundings which give them fresh air, nourishing food, and bring them less into contact with conditions which produce sexual suggestion. In the city, again, association with older girls, association with the opposite sex, early entrance into social life, attendance at theatre, and the reading of general literature all have a bad sexual effect. All these, added to the knowledge of development and the establishment of the menstrual function, and the character of the child's associations, determine the degree to which the hazy and indefinite "sexual instinct" follows a normal or excitable course. Psychologic reaction to the "sexual instinct" at puberty evidences itself in many ways, all of which represent the need of expressing objectively the newly developed inner feeling. Religion and poetry are often the fields in which these longings are expressed. Young girls at puberty often give themselves up to enthusiastic admiration and adoration of ideals or concrete factors. The mind of adolescent girls is often occupied with thoughts which concern the objects of their affection. Exciting or immodest

literature and plays and the influence of sophisticated associates may start the indefinite, hazy, sexual inclination into a flame (Kisch).

The Influence of Heredity.—The surroundings and training of the young girl have much to do with the way in which ovarian activity acts on the brain and nervous system. Heredity, however, plays an all-important part.

A neuron, feebly endowed and without enduring qualities, is acted on with marked force by the conditions which reduce the general health. There then results a neuropathic disposition of the nervous organism which yields readily to severe strains and unusual influences. As Mendel says, a hereditary basis generates a predisposition to mental and nervous irritability and produces certain peculiar natures which deviate in thought and action from the average. These individuals with difficulty preserve their nervous equilibrium. Many psychic peculiarities arise from imitation in childhood, through vicious environment or by faulty training. The cramming in schools plays an essential part only if it forces slightly gifted children to unusual work and puts too great a strain on a weak general system.

The hereditary taint, especially if connected with anemia and onanism and infectious diseases, may form a basis on which nervous and mental alterations may develop between the twelfth and twentieth years, which alterations are most frequently of a hysterical nature. If children tainted hereditarily are exposed to mental exertion not corresponding to their powers, and if there is combined with this onanism and great loss of blood at the beginning of the menstrual epoch, a psychosis may develop at the time of puberty.

In the simple forms the disease is generally characterized by hypochondriac depression, and the girls feel themselves incapable of labor. These children are backward at school, sleepless, suffer from headaches, cardiac palpitation, and loss of appetite. They become refractory, disobedient, and disrespectful. These children are considered as lazy and ill-bred and the real condition is not recognized as pathologic.

The establishment of menstruation is especially liable to excite nervous disturbance in hereditarily neurasthenic and psychopathic girls.

Neuroses at Puberty.—Neuroses and psychoses may develop during puberty in such girls or in individuals living under unsatisfactory conditions of life or under the pressure of constant disturbing or irritating influences. Among these Kisch mentions hemicrania, precordial anxiety, epilepsy, imperative concepts, kleptomania, pyromania, and various phobias and anxieties.

The establishment of menstruation sometimes acts well and improves the nervous condition; especially so is this the case in well-developed girls who have not yet menstruated.

The inherited psychopathic tendency shows itself especially at puberty. The neurotic predisposition, kept in the background by the resistance and energy of childhood, takes on a sudden and stormy evolution through the menstrual stimulation and its associated constitutional involvement. Most frequently mania and melancholia are noted; then the morbid ideas associated with imperative concepts and the moral psychoses of puberty, according to Kisch. Hysteria often develops at the time of the establishment of menstruation. Commonly the first hysterical attack occurs in association with the first menstruation; or else the first menstruation brings back a previously existing but vanished hysteria. It is generally of mild form, consisting of attacks of laughter and tears, globus hystericus, and clavus hystericus. Hysteria major rarely occurs during puberty.

Nearly one-half of the cases of hysteria develop between the fifteenth and twentieth years of age. The frequency of hysteria diminishes rapidly after the twenty-fifth year. Bernutz says that one-half of the cases of hysteria in women evidence themselves shortly before or at the first establishment of menstruation. Amenorrhea and dysmenorrhea seem to stimulate the development of this nervous condition. Less frequently it is of the hystero-epileptic type. Associated with this condition are commonly so-called nervous moods, weakness of will, nervous instability, and functional anesthesias, convulsions, and paralyses.

At the time of puberty there is a tendency in young girls of neuropathic heredity to epilepsy; it occurs suddenly with the first menstruation, and is generally then considered as a fainting fit due to the menstruation, but these attacks recur at each menstrua-

tion, and most of these attacks of fainting in association with menstruation prove to be epilepsy.

Among other conditions developing at puberty are migraine and chorea minor. Migraine often first begins in young girls entering puberty between the thirteenth and fourteenth years. Chorea minor, which is a functional disturbance in the motor area of the nervous system, is observed during the period preceding and comprising puberty, and is to be brought into relation to the changes occurring during this period of body development, especially in girls.

NERVOUS SYMPTOMS IN CHLOROSIS

Among the symptoms of chlorosis are "irritable heart, dyspepsia, and constipation, due to atony and passive dilatation of the stomach and intestines. There is easy exhaustion and fatigue of the skeletal muscles. There is a general sense of languor and lassitude. There is a great variety of spinal aches. Reflected neuralgias result from pressure on the spinal roots because the vertebræ are not kept in normal position by the weakened muscles" (Thomson).

In chlorosis there is often associated a poor development of the genitalia. The pelvis in a certain proportion of cases is of the child's type; in others there is a poor development of the external genitalia, or a uterus infantilis, small ovaries, poorly developed breasts, etc. Seventy-four per cent. have failures of genital development of one form or another. Among non-chlorotics these conditions are found in only 24 per cent. Menstruation is, as a rule, disturbed. During the chlorosis there is very frequently absolute or relative amenorrhea. Those affected with menorrhagia always show a decided change in the mucosa. In all, 77 per cent. present a weakening of the menstrual function.

Chlorosis is often hereditary, and occurs exclusively in girls, most frequently during the years of development and the years immediately following, and shows a tendency to recur. No theory with regard to chlorosis which leaves out of consideration its occurrence in girls only, at the time of or in connection with sexual development, deserves attention. It occurs most frequently between the fourteenth and twentieth years. According to Nie-

meyer, such cases as occur for the first time after the twenty-fourth year are almost never chlorosis.

Thomson believes the inference to be clear "that chlorosis is in some way related to the function of ovulation, and the problem is to find what this relation is."

Chlorosis is a disease of puberty, with a tendency to recur in later years. Here all the toxic elements which are so often met with as causative factors in other anemias fail. The patients do not lose in weight, nor do they seem toxic. The hemoglobin sinks lower than the blood-cell count. The hemoglobin may sink to 50 per cent. while the blood-cell count remains normal. Virchow describes a menorrhagic and amenorrheic form of chlorosis. The latter is the most frequent. This form shows small ovaries with few follicles. The menorrhagic form shows the follicles increased threefold. Virchow considered the hypoplasia of the genitalia as a secondary manifestation, and dependent on the hypoplasia of the vessel system. However, hypoplasia of the genitalia does not always show an accompanying hypoplasia of the vessel system, and, on the other hand, the hemorrhagic form may be associated with infantile genitalia. The modern opinion believes the weakened blood-forming power to bear a relation to the female sexual organs, since from them stimulation is furnished to the blood-producing structures. Just whether, or how much, a diminished or increased secretion of the ovaries bears a relation to these changes is not definitely settled. An even balance in the economy is dependent on the proper function of the ductless glands. Every change in them acts upon the character of the blood, since it is the blood which takes up the various secretions. In chlorosis there is usually a weakening of menstruation of various degrees down to total disappearance. Menstruation may first begin between the fourteenth or sixteenth years or later. The bleedings are weak and watery. The menorrhagic type is relatively seldom, probably one out of five; it is possible that the menorrhagia is due to too much ovarin. A large percentage of chlorotic girls suffer from dysmenorrhea. These pains are sometimes due to the coagulation of the blood in the uterus, as there seems to be a tendency to faster coagulation in all but the most severe cases.

Women with lung tuberculosis treated with tuberculin, according to Spengler's method, found that bad dysmenorrhea was frequently cured. Eisenstein and Hollos consider that dysmenorrhea is a part of a tubercular toxic reaction. They consider many of the symptoms which belong to chlorosis to be of tubercular origin, such as headache, dizziness, palpitation, indigestion, sleeplessness. Most of these symptoms disappear in a few weeks with the use of tuberculin (Eisenstein and Hollos). In dysmenorrheic women there often develop symptoms of chlorosis and tuberculosis. Graefenberg injected thirty dysmenorrheic women with old tuberculin and obtained twenty-one positive reactions. All positive cases belong to the group of primary dysmenorrhea; that is, the disturbances exist since the development of menstruation. All secondary dysmenorrheas are negative. Graefenberg considered chlorosis as a beginning tuberculosis. Hegar and others found tubercular heredity in half of the cases of chlorosis. If this be so, then at puberty, under the influence of ovulation, there is a diminished resistance and a greater sensitiveness toward various injuries, among the latter being tuberculosis.

A justification for the statement that chlorosis is due to diminished ovarian secretion is furnished by the effects of ovarian therapy in these cases. It may be considered that in chlorosis, with a failure of proper stimulation of the uterus and its lining, a diminished menstruation prevents thereby an excretion through the menstrual blood of toxins produced at puberty. There may likewise, at this stage, be a certain antagonism between the thyroid gland and the ovary. Since many of the cases of chlorosis present symptoms not unlike those found in Basedow's disease, it is possible that a too greatly diminished secretion of ovarian extract causes a relatively increased amount of thyroid extract to circulate in the blood. For this speak the good results obtained by Seeligman and others in the treatment of typical morbus Basedowi with ovarin. The ovarian secretion is a stimulator of blood-formation, and causes a congestion of the genital organs. Thyroid extract, on the contrary, causes anemia of the genital organs, as is seen in the good results obtained by the treatment of uterine fibroids with thyroid extract. It is possible that those chlorotic patients who

take on fat have not alone a diminution in the function of the ovary, but likewise a diminution in the function of the thyroid, while those suffering with the milder symptoms of morbus Basedowi have, with a diminished secretion from the ovary, a relative over-secretion on the part of the thyroid.

NERVOUS SYMPTOMS DURING MENSTRUATION

The ovarian secretion produces every twenty-eight days a pelvic congestion, which is relieved, if no impregnated ovum is present in the tube or uterus, by a flow of blood from the uterine lining known as menstruation. Associated with this local congestion is a general congestion in the entire body, especially located in the various mucous membranes. This general congestion has naturally an irritating influence, and is more apt to increase any annoyance existing in the sensitive portions of the body. It increases the tendency to skin affections; and it increases the tendency to headaches and to neuralgias, and it increases any tendency to excitability, mild hysterical attacks, etc. These results are due to the constitutional processes which are associated with menstruation and to the coexisting stimulation of the thyroid.

Schauta gives us the symptoms noted in other organs than the uterus during menstruation, and especially in dysmenorrhea—feeling of heat, cold feet, vomiting, pain in the abdomen, loss of appetite, frequency of urination, dyspepsia, headache, hysterical manifestations, etc. Among the latter there is conjunctival anesthesia, hyperesthesia of certain points in the abdomen, singultus, spasm of the glottis, epileptiform attacks. Recurrences of dysmenorrheic pain are sometimes enough to shatter the nervous system and to provoke neuroses and psychoses. One of the most important sequelæ of dysmenorrhea is headache, diffuse or of the form of hemicrania. Long-existing dysmenorrhea increases the tendency to the development of hysterical attacks.

Amenorrhea.—If the ovaries are functionating, there often occur strong painful molimina menstrualia, which appear at the time of the expected but omitted bleeding. If there is absence of or markedly diminished ovarian function, there are no local annoyances. Amenorrhea may be associated with mental irritability, skin

hyperesthesia, and various neuralgias and true psychoses. Amenorrhea is often due to chlorosis, obesity, diabetes, and the abuse of alcohol and morphin, myxedema, and Basedow's disease. With these, of course, there exist the special nervous symptoms of the particular disease.

Menorrhagia and Metrorrhagia.—If of great amount, either produces anemia. Patients are pale, incapable of activity, suffer readily from palpitation of the heart and fainting attacks, and are prone to degenerative processes in the heart muscle.

ONANISM AS A CAUSE OF NERVOUS SYMPTOMS

Onanism must be reckoned among the factors which predispose to increased irritability of the nervous centers. Koblanck found that of thirty cases of amenorrhea all confessed to masturbation. Sixteen were married, and of these eight had borne children. The duration of amenorrhea varied from three months to several years. The symptoms were headache, dyspnea, and sleeplessness. The tendency to masturbation was especially strong at the time for menstruation. Attracted by the observation of Fleiss, Koblanck noted that many disturbances in the menstrual function, especially dysmenorrhea, are associated with circumscribed swellings of certain nasal areas, namely, the anterior end of the lower turbinated bone and the directly opposite area of the nasal septum. He found that this was produced by strong sexual excitement unaccompanied by the relief resulting from physiologic completion of this state. For the treatment of amenorrhea, the stopping of the masturbation is a necessary factor.

Koblanck observed that menorrhagia was often due to masturbation and to disturbances of a sexual character. Sixteen women with menorrhagia and metrorrhagia acknowledged abnormal sexual processes (especially interference with natural completion, due to a desire to prevent conception). The symptoms improved with the regulation of the sexual relation. These disturbances resulting through masturbation in the non-gravid open to him the question as to the possibility of evil results in the pregnant. He observed that unconscious eclamptics often practised onanism. He found in these eclamptics nasal swellings and enlargement of

the thyroid lobes. He questioned twenty women who recovered from eclampsia, and many confessed to onanism in pregnancy. The desire to masturbate was observed in those who practised onanism before marriage as well as in those who had not made use of this practice before.

In the opinion of some, masturbation does not act injuriously through mechanical irritation, but does act injuriously psychically. It may be said, however, that masturbation does produce congestion which is not relieved and regulated by the omitted orgasm. What is the relation of masturbation to anomalies of menstruation and to psychic disturbances? If masturbation produces amenorrhea or disturbances of menstruation, we may infer a consequent alteration in ovarian secretion and its elimination. If we grant that masturbation has an effect on menstruation, we may safely add psychic phenomena to the list of resulting evils. On the other hand, it may be asked whether masturbation is entirely a cause or a symptom, and whether onanism and amenorrhea are not often evidences of defective ovarian action and secretion and defective mental and nervous organization. At any rate, we may grant that increased nervous irritability is the result of onanism. More especially would this be true in the case of the pregnant woman. Onanie may be stimulated in very young children as a result of local irritation. In adolescent girls about the time of puberty there results, through changes produced by sexual instinct, by knowledge, and by discussion of the question, an indefinite attraction toward the genitalia which leads to onanie, which attraction is more intense and occurs earlier if the girl is hereditarily psychopathic. The local menstrual congestion plays a rôle in onanie by producing hyperesthesia in the genitalia. The patients are pale, with tired expression of the face, dark rings about the eyes, dreamy in their movements, remain long in bed, etc.

A tendency to onanism is produced either from the periphery or from the centrum. The two forms are, first, peripheral and mechanical; second, psychic or thought onanie. In the peripheral form, onanie is produced by friction of the clitoris and vagina brought about in numerous ways. In the second form the orgasm is produced by central stimulation, by imagination and fantasy of a sexual, lascivious nature. In older individuals the sequelæ

are fluor, menorrhagia, pain in one or both ovaries, pallor, hysterical symptoms. A neuropathic predisposition often plays a causal rôle. When this neuropathic tendency is absent, onanie only by excessive practice causes marked nervous disturbances. Lowenfeld says that the nervous annoyances resulting from onanie in a certain number of cases follow the sexual form of myelasthenia characterized by backache, hyperesthesia and paresthesia of the form of ovarie and pruritus vulvæ, increased frequency of micturition, coccygodynia, a feeling of weakness and cold in the legs and the occurrence of pollutions. In the course of time there occur symptoms of cerebral and visceral neurasthenia, such as headache, sleeplessness, palpitation of the heart, nervous dyspeptic symptoms, so that more or less the condition rises to the dignity of a general neurasthenia. In addition, various hysterical symptoms may be added to the neurasthenic annoyances.

NERVOUS ANNOYANCES IN PREGNANCY

The congestion occurring in menstruation is, of course, carried on continually through the period of pregnancy, and while there is no absolute rule in the matter, it is quite sufficient to increase the same tendency to annoyances as is observed in the congestion of menstruation. In addition to this, we must remember that the placental secretion is an added element present in the blood of the mother, and that it may, and does in numerous cases, add further annoying symptoms to the expected physical discomforts which generally accompany that state. The feeling of nausea, the morning vomiting, the emesis, and the hyperemesis are all annoying factors associated with pregnancy, especially in the early months, and are in all probability due to or aggravated by the action of placental secretion.

Nervousness, nervous annoyances resembling "hysterical symptoms," chorea, etc., are recognized possibilities in the course of pregnancy. It is evident to every one that women with nervous symptoms are not infrequently made worse by the metabolic changes and the added placental secretion associated with gravidity. That women who are pregnant are liable, for emotional or other reasons, to the same general nervous annoy-

ances as non-pregnant women are, is of course not to be controverted. On the other hand, many women feel better during, and especially after, a pregnancy than they did before. Even in pregnancy symptoms resembling hysteria or neurasthenia occur in women who formerly showed no evidence of these conditions, and it is quite possible that alterations in the relation between the ovary, the thyroid, and the placental secretion are responsible for these changes.

The proneness of women to gastro-intestinal derangement in connection with menstruation, pregnancy, and the menopause is well known. In each of these conditions digestive disorders frequently occur, with nervous accompaniments not unlike in nature to the incipient symptoms of Graves' disease.

We need only refer to the experiments which have been made on pregnant rabbits, showing that in them the nervous system is much more excitable than in rabbits not pregnant. The same sensitiveness of the nervous system is beyond doubt present at menstruation, and most assuredly is this the case during pregnancy. It needs only casual mention to recall the fact that even today many consider the nausea and emesis of pregnancy to be due to hysteria, and that some observers have noted the stigmata of hysteria in such cases. We here again repeat that, while the condition of pregnancy and its associated metabolic changes naturally aggravate nervous conditions, the nausea and vomiting of pregnancy are due to metabolic changes occurring in that state, and that among the causal factors is the irritating placental secretion.

THE RELATION OF PTOSES TO NEURASTHENIC SYMPTOMS

A large proportion of displacements of the uterus and adnexa, of chronic congestion and venous stasis in the pelvis, are associated with "reflex" and constitutional symptoms. Not infrequently ren mobilis, gastroptosis, and enteroptosis are found coexisting. These patients often possess a flabbiness and lack of elasticity which is by no means the result of the gynecologic condition, so that *we are compelled to consider the latter as part of a general state.* From the gynecologic standpoint we name this local condition hysteroptosis. In addition to a *local genital subinvolution,*

there is often present a *general constitutional subinvolution*, that is, a failure after labor in the return to the normal on the part of the various intra-abdominal ligaments, of the abdominal muscles, and of the general elastic and circulatory apparatus. Many of the symptoms due to such conditions in women are erroneously attributed to uterine versions and flexions, and to minor genital pelvic changes acting through reflex paths, and also to hysteria or neurasthenia.

A frequent obstacle in the proper care of these cases is the *firm belief on the part of many patients that a gynecologic trouble is solely responsible for their general nervous condition.* It is certain that many women suffering from abdominal and pelvic ptoses are considered to be hysterical or neurasthenic or nervous. The symptoms of splanchnoptosis (Glénard) are: (1) debility and lassitude; (2) sensations of uneasiness, weight, dragging, craving, emptiness, etc., in the abdomen; (3) symptoms of dyspepsia; (4) nervous symptoms. The relation formerly considered to exist between ren mobilis and the general nervous condition of the patient is now recognized to really exist between a combination of abdominal ptoses and a general state. It cannot be said that abdominal and pelvic ptoses cause neurasthenia. It may be more justly said that neurasthenic women are prone to abdominal ptoses; that Glénard's disease and neurasthenia are sometimes combined. It can be said, however, that abdominal ptoses and pelvic ptoses are often productive of "neurasthenic symptoms," and that many patients suffering from abdominal and pelvic ptoses do have symptoms which, especially if the cause be not recognized, can readily lead to a diagnosis of hysteria or neurasthenia. One has only to consider the relief afforded by abdominal supports and by hydrotherapy as well as by local therapy, to see the relation which these ptoses bear to symptoms often attributed to pelvic conditions alone or to neurasthenia.

Abrams has described a special form of nervous weakness designated as "*splanchnic neurasthenia*," which is characterized by paroxysms of depression of varying duration, and which are specified popularly as "the blues." Splanchnic neurasthenia is characterized by attacks of depression which come on spontaneously without apparent cause and depart as mysteriously as they came. Abrams believes an attack of the blues to be naught else but an

acute neurasthenia, or a periodic exacerbation of chronic neurasthenia. He holds that many cases of neurasthenia have an abdominal origin, and that the neurasthenia may be referred to a defect in the nerve apparatus which controls the supply of blood in the abdominal cavity, and that this condition is eradicable by simple methods. He finds a large number of gastric and intestinal affections, with bizarre and protean symptoms, designated as gastric and intestinal neuroses, which in reality owe their genesis to the congestion of the intra-abdominal veins. The greater the intra-abdominal tension, the less blood will be contained in the abdominal veins. This tension is largely dependent on the tone or tension of the abdominal muscles. Therefore, nervous exhaustion is a frequent cause of diminished tone of the abdominal muscles, which in turn diminishes intra-abdominal tension and conduces to blood stagnation in the veins of the abdomen. The toxic products of digestion, which are normally removed by an unimpeded circulation, have a specifically poisonous effect on the sympathetic system, a fact which is evident, owing to the frequent occurrence of depression, prostration, and nervous symptoms in nearly all disorders of the alimentary canal. In his opinion the entire question of splanchnic neurasthenia is one of abdominal plethora, dependent on a variety of causes, notably diminished intra-abdominal tension, insufficient lung development, a defective vasomotor apparatus. Splanchnic neurasthenia is one of the forms of neurasthenia amenable to permanent cure, by measures having for their object the relief of abdominal venous congestion.

DIMINISHED EXCRETION OF UREA

The amount of urea output in women is often below the normal. In such states various "nervous symptoms" are often present. W. H. Thomson mentions among the symptoms of deficient urea excretion headaches, mental depression, severe neuralgias, constantly shifting from one part of the body to the other, all kinds of paresthesias, somnolence alternating with insomnia, and a sense of general prostration, especially in the morning, and also in some instances polyuria. Thomson says that these cases are generally diagnosed as hysteria or neurasthenia.

HYSTERIA

"Hysterical Symptoms."—Gowers says that the manifestations of hysteria may be divided into a mental state and into motor and other symptoms. There is defective power of will, imperfect self-control, inability to resist the impulses of inclination, irritability of temper, undue sensitiveness to annoyances, whereby trifling cares and vexations become grave troubles. Self-consciousness dominates the patient's thoughts and even her actions. Laughter and tears come readily. There is the globus hystericus. Such patients are characterized by variable moods, by emotional, excitable temperament. The patients are easily exalted and easily depressed; tears and laughter follow on insufficient cause. There is too ready susceptibility to passing impressions of the moment. There is increased sensitiveness, hysterical tenderness, and neuralgic pain. There is hyperesthesia or lessened sensibility, often in the legs, with motor weakness. There are areas of anesthesia. The ovarian region is often sensitive, as is also the spine; there are palpitations, flushings of the face, vasomotor spasm, fainting, and vomiting.

The stigmata of hysteria are corneal and pharyngeal insensibility, areas of skin anesthesia and hyperesthesia, concentric contraction of the visual fields, hysterogenic zones, convulsions. There is tenderness, either superficial or deep. The patient is generally aware of it, in contradistinction to anesthesia. There is tenderness often in the ovarian and inframammary regions, in the upper abdomen and along the spine. Patients suffer from dyspepsia, gastric pain, flatulence, obstinate diarrhea, diarrhea after eating, rapid action of the heart on the slightest emotion, with or without subjective sensation of palpitation.

Tremor may be present, which is fine and rapid, like that in alcoholism or in Graves' disease. There may be tachycardia with or without palpitation. There may be a persistent rapid pulse. *The differential diagnosis must be made from the irregular forms of Graves' disease.*

There is often irritability of the bladder, the patient sometimes passing water twenty to thirty times a day.

"The motor, vasomotor, sensory, and circulatory symptoms are

related to emotional disturbances, alike in their commencement, course, and manifestation. They frequently follow mental shock, or are gradually evolved under the influence of more persistent emotional disturbances, and may be intensified from time to time under the same influence. Another characteristic is the mutability of symptoms, whereby grave troubles of one kind cease and give way to other symptoms, such as cannot result from the same organic causes as the first."

I accept Osler's view that hysteria is often diagnosed where there is really neurasthenia, and that in the absence of hysterical paroxysms, of crises, and of those marked emotional and intellectual characteristics of the hysterical individual, the diagnosis of hysteria should not be made. The tendency to hysteria is primarily an evolutionary defect. A marked constitutional hyperemia at every menstruation, severe dysmenorrhea, and long-continued pelvic pain are among the exciting factors which may bring on hysterical manifestations in predisposed individuals. Likewise, the preying consciousness of an abnormal pelvic condition, though in reality giving rise to no symptoms, may act as a psychic irritant. However, the causal relation of pelvic diseases to hysteria has been grossly exaggerated.

NEURASTHENIA

Nervous persons, says Clarke, are perhaps best distinguished from those not so disposed by a difference in physical reaction to external agencies, by a tendency to exhibit psychic disturbances on what appear to be inadequate causes.

Many persons possess a congenital peculiarity of nerve function, for which they may seek medical advice, but which is not really morbid. Such is the persistence of the "shyness" of early life, or a tendency, lifelong, to look on the darker side of things, or the vasomotor activity which causes so many persons, all through the first half of their lives, to blush on the least emotion and flush under every favorable physical influence. In many cases of neurasthenia the condition is distinctly "constitutional"; that is, the defect in the nervous system is inherent in the individual, and a similar ancestral tendency can often be traced. It dates from childhood in some; in others it comes on after puberty or in early adult life,

without any discoverable cause. Of the latter a large proportion are females, who are unable to bear even the average strain of life and break down in various ways. They may be raised to a little higher level of nervous health, but cannot be made really strong (Gowers).

Clarke defines neurasthenia as "a nervous disorder without any known alteration in organic structure, characterized by a persistent state of fatigue, and hence of weakness of the central nervous system, in the absence of the causes which normally are adequate to induce such fatigue, and at the same time by a loss of control on the part of the higher nervous centers, and hence by an excessive reaction in certain directions to slight irritations."

The cardinal symptoms, recurring in different combinations, and called by Charcot the stigmata of neurasthenia, are pains in the head, dizziness and vertigo, inability for mental work, various disorders of sleep, irritability of temper, weakness and tremor of the limbs, pains in the back, palpitation, certain forms of dyspepsia, sexual weakness, worry over trifles, loss of will-power, indecision, hesitation, insomnia. There may be tremor, which is fine, like that of Graves' disease, or fine twitchings of the tongue and eyelids. Tenderness and pain are felt over the spine. The pulse in many cases is between 80 and 90, occasionally 100 to 120. *It is hard to make the diagnosis from the milder forms of Graves' disease.* Attacks of tachycardia occur after excitement or mental strain. There is dyspepsia or some form of gastro-intestinal disorder; flatulence or diarrhea or constipation. Glénard's disease is not often found. Irritability of the bladder and oxaluria are rather frequent. Weakness of the legs is common. There is often tremor in the legs, with a feeling of "giving way" at the knees. The patients have anxieties and fears.

Fatigue may be produced with undue readiness by muscular exertion and by mental effort. Muscular strength is only lessened in the severe degrees of nervous weakness, but the power of sustained effort is generally reduced. Fatigue is not only sooner felt, but is often a more unpleasant sensation than the fatigue of health, and whatever pain or discomfort to which the sufferer is liable is apt to be induced. Often talking may cause a feeling of weariness and cephalic sensations to which the patient is liable. Many of

the sufferers habitually talk in a low voice, as if every sentence involved an exertion almost beyond their strength. A sense of muscular inertia and powerlessness is very frequent, especially in the earlier part of the day, when there is no real lack of strength. The least effort, indeed, for any exertion may seem beyond their power. The frequency with which the gynecologist is confronted with symptoms of neurasthenia makes it imperative that he have a clear conception of the relationship of these nervous phenomena to the conditions which he is called upon to treat. It takes more than a few "neurasthenic symptoms" to constitute the clinical entity neurasthenia. Anemia, onanism, pregnancy, the puerperium, lactation, the climacterium, are contributing factors in producing neurasthenic symptoms. Unless associated with great continued loss of blood, or with long-continued pain, I do not believe that pelvic diseases, viewed as local conditions, are responsible for the development of the essential neurosis, neurasthenia.

REFLEX NEUROSES

A subject which is of greatest interest in gynecology is the question of reflex neuroses.

There is a tendency to refer many or all of the nervous symptoms, especially in married women, to local disturbances in the genital tract. Prolapsed ovaries, cystic ovaries, lacerated cervices, anteflexions, and especially retroversions and retroflexions, are accepted as the etiologic causes, through reflex channels, of many and numerous nervous symptoms. We find many observers who attribute to reflex channels the etiology of symptoms, while others consider the association of pelvic lesions and general nervous symptoms to be a coincidence, while still others consider the local lesions as the exciting cause in predisposed individuals.

Numerous women bear children, work hard, and never have physical or nervous annoyances at any period of their lives. We know others who, for causes mainly inflammatory and circulatory, have constant physical pelvic disturbances without nervous manifestations. We see many women who, combined with these local pelvic disturbances, evince nervous phenomena of greater or lesser variation. Another large class is formed of those who,

without local tangible pelvic changes, have nervous annoyances of a greater or lesser degree.

W. H. Freund speaks of the "predisposition of sex," and says that we must seek in local processes, in disturbances of nutrition, and in the variations of metabolism the elements productive of nervous annoyances. General disturbances of nutrition, as they occur in women's diseases, furnish a high degree of predisposition. Chlorosis and anemia are factors of importance. Menstruation, labor, subinvolution, loss of blood and secretions, poor digestion following severe diseases, cachexia, and early senescence are also to be mentioned. "All these factors may produce nervous annoyances or serve as the agents predisposing to neurasthenic and hysterical symptoms."

Freund recognizes a strong predisposition in these mentioned changes, and in direct injuries, in inflammatory changes and infections of the genitalia, in sexual overexcitement, in atony of the pelvic and abdominal organs. Of importance, in addition, is also hereditary tendency, congenital irritability of the nervous system, unsuitable education, and psychic changes.

The diagnosis of pelvic abnormalities as the cause of pain elsewhere produced through reflex is to be made with care. Many general conditions are to be looked for. A thorough examination often shows hysteroptosis, enteroptosis, gastroenteroptosis, ren mobilis, etc., to be responsible for many annoyances attributed to uterine malpositions, to cervical lacerations, etc. Many women have pelvic pain due to unrecognized parametritis, to slight degrees of salpingitis, peri-oöphoritis, etc. Many suffer from rheumatism and auto-intoxication. Headaches and neuralgic pains are frequently due also to nodules and deposits in various parts of the body which may be removed, to the vast benefit of the patient, by persistent massage. Many suffer from backache because of enteroptosis or hysteroptosis, or parametritis or pelvic congestion. Women often have annoying symptoms, which depend on a faulty and diminished excretion of urea or are due to lithemia. This extremely important condition in women should always be looked for. Further, a diminished excretion of urea is productive of many nervous symptoms.

I do not believe that those anatomic changes in structure which

do not cause pain can be considered as factors by way of reflex in the causation or accentuation of nervous symptoms. Attention is due cases with actual lesions of importance in the genital tract. *We must grant that inflammatory changes of minor or severe degree which cause marked or protracted pain can readily wear down the nervous system.*

"It is not always easy to decide whether, in conditions occurring at the same time in different parts of the body, there exists an accidental coexistence or a causal relation. In general, one thinks first of a connection by means of the cerebrospinal or sympathetic nerves," in spite of the fact that to these, as W. H. Freund says, there falls an inferior rôle. The relation of the internal secretions to the nervous system is far more important.

He, however, believes that irritation of the nerves of the genital organs by palpable nodules, sclerosing connective tissue, an inflammatory focus, a hemorrhage, give rise to reflex symptoms. The paths through which such lesions act reflexly are the spinal cord and the cerebrospinal fibers, but especially the sympatheticus, by which the genital system is richly supplied. In parametritis chronica atrophicans, severe perineuritis and neuritis of the nerve-supply situated in the broad ligament have been found. Freund considers this condition as an established basis of hysteria and says that where this condition is present hysteria is never absent. He defines hysteria as "that disease in which there is clearly noted, coming out from the diseased area, and also called forth by examination, reflex neuroses, which, according to their place of manifestation, must be called sympathetic, or spinal, or cerebral. To this neurosis, sooner or later, is added a psychic reaction, differing according to constitution, inheritance, and 'bringing up.'" We see here a definition of reflex etiology not in keeping with the generally accepted understanding of hysteria pure and simple, a definition with which I do not agree.

In the discussion of Freund's views the following opinions have been expressed.

Bröse says that in cases of severe hysteria he finds, in almost all of them, parametritis atrophicans. He makes the diagnosis through the stigmata of Charcot. One patient, with all the objective and subjective symptoms of hysteria and hysterical delu-

sions, had parametritis atrophicans. He fears that she will end in the insane asylum. In a second case he did a ventrofixation, and the local and hysterical symptoms disappeared, although for weeks after the operation the patient suffered from hysterical vomiting. There are many patients who have hysteria with objective symptoms, even after the correction of the displacements. The reflex neuroses of a retroflexion have, in his opinion, nothing to do with hysteria. Chronic adnexal troubles, without parametritis atrophicans, do not cause hysteria. He believes chlorosis to be a cause of hysteria, and considers hysteria a secondary condition, and not a true psychosis.

Olshausen says that hysteria is a psychosis, and that reflex neuroses do not constitute hysteria. There are, however, certain local lesions which do cause this condition, and he mentions the case of a girl twenty years old with severe hysteria and epileptiform attacks occurring every night at 8 o'clock. In spite of isolation and various attempts to deceive her as to the time of day, the attacks occurred regularly at the same hour, and he removed her ovaries and the patient became well. He believes that faulty training of wilful children, especially where the conduct of the child has been poorly controlled, is often the cause of hysteria appearing at puberty.

Koblanck says that he sees many neurasthenias, but few hysterias. He believes that sexual disturbances are a frequent cause of nervous conditions.

Mackenrodt finds the most important cause of neuroses in the field of the sexual organs. He had a case like Olshausen's, which was cured by operation, and stated that Sänger made the same observation in many cases in the Leipsic Insane Asylum. Mackenrodt finds with Freund's disease many neurasthenic symptoms. The local condition acts for years, until a strong psychic irritation occurs and then a psychosis results.

Shaeffer finds that retroflexion, combined with ren mobilis, enteroptosis, and loose abdominal walls, are closely related, etiologically, to psychic conditions. In his opinion, all chronic gynecologic troubles, especially inflammatory, may give rise to hysteria.

Lippmann says that hysteria is a disease of the central nervous system, which in predisposed cases can be started from various peripheral parts of the body, through various conditions in those

parts, most frequently from the genital system, and sometimes from the ovaries. He refers to a case of hysteria in a girl who menstruated at twelve, with pain in the ovarian region. He mentions the fact that for the first year and a half of the disease the attacks followed a monthly type and then became general. She then developed fibrillary twitchings, temporary contractures, convulsions, and finally opisthotonos of long duration. She was operated on by Schroeder at the age of twenty-six. One ovary contained a dermoid, the other was cystic. The attacks stopped, and in four years she was well.

Steffeck believes in various causations. He does not think that gynecologic troubles are the cause of hysteria, but holds that in *the hysterically predisposed individual, through auto-suggestion or ecto-suggestion, there develops the idea that there is a definite area, an injured spot, which produces the hysterical symptoms. Steffeck terms them, if they are to be regarded as hysteria, "local or localized hysteria."* He believes hysteria to be a true psychic disturbance, through inherited or acquired sensitiveness, as a result of which a pathologic reaction occurs, with the most varied injuries. He believes that faulty education, disturbances of adolescence, uncongenial marital relationship, etc., are important points in the causation of hysteria.

Strassmann is very careful in the diagnosis of hysteria. He believes that nervous symptoms may be produced by abnormal sexual relations, not alone physical, but also mental—coitus interruptus, masturbation, marriage with impotents, and in women not happy in a sexual-ideal way in marriage, women who feel themselves neglected, etc. He does not accept Freund's etiology.

Gottschalk says that not every hysterical symptom makes a hysteria, and he speaks of a reflex hysteria and of a central hysteria. Peripheral lesions may reflexly cause a hysterical picture, but these cases are far in the minority. He believes in the element of heredity, and when an irritating cause appears, a hysteria develops. Among the irritating causes are marriage with impotents, masturbation, and coitus interruptus.

I believe that the views of Strassmann and Steffeck are the correct ones, and that they dispose, to a great extent, of reflex neuroses and bring us to a realization of the fact that incessant

pain and mental perturbation act sometimes without injury and sometimes with injury, upon the nervous system of the female, *according to the predisposition of the patient.* We can see here the great difference in opinion as to the etiologic relationship between gynecologic conditions and nervous symptoms. That most of the cases considered to belong under the head of hysteria are really "neurasthenic" is certainly true. We should not attribute to purely local pelvic conditions not associated with pain the causation of neurotic and psychic phenomena.

The reaction and mutual relation between physiologic functions and altered activity of the ovaries, on the one hand, and the general organism, on the other, must be considered. We not only need an anatomic knowledge of the genital system and its diseases, but must also observe the influence of genital and sexual development on the general female organism. We must study the relation of normal and altered ovarian and thyroid activity on the psychic and physical characteristics of women. The first onset of menstruation, the period of complete development of the sexual organs, the elements of sexual relation, conception, pregnancy, labor, puerperium, and the retrogressive changes involved in the climacterium and the cessation of menstruation cause physiologic processes and pathologic changes in various organs and in the general nutritive condition; in the function of the heart and circulation, in the ovaries, nerves, skin, mind, digestion, and metabolism.

Modern culture and social conditions have an unfavorable influence on the sexual organs of women, which finds its expression in the great frequency of gynecologic diseases. Faulty training and manner of life lead to violations of nature's laws, and to injuries in the genital sphere. Even before complete puberty the phantasy of young girls is directed to the sexual processes by improper books, by plays, by social intercourse with men and women whose conversation and bent of mind are not clean and wholesome. Exciting and depressing psychic influences pass out from the genital sphere. The growing girl recognizes at puberty the meaning of sex; the developing woman feels an attraction to sexual gratification. Though the desire for children varies in degree, the sadness of sterility is often a tragedy. The influence of maternity and pregnancy is of much psychic impor-

tance. The period from puberty to marriage may be influenced too much by the awakened sexual inclination. Inactive life, improper nourishment, and the early use of alcoholic drinks influence the psyche during this period and tend toward the development of the neurasthenic state. Late marriage furnishes an individual too well informed in sexual matters, and often one weakened and nervous through sexual longings and stimulations (Kisch). Sexual intercourse, with the accompanying methods of preventing conception, have a bad effect on the nervous system and the genitalia of women. Actual or relative impotency of the husband, failure to show kindness and consideration, are productive of neuroses. The congestive influence of the ovaries, and the relation of the ovaries to the thyroid, produce marked changes in the genitalia and the genital sphere.

CARDIAC PHENOMENA ASSOCIATED WITH SEX FACTORS

"Every phase in the life of a woman, closely related as it is to the periodicity of the feminine sexual functions, beginning with the onset of menstruation and continuing on through wedlock to the disappearance of sexual activity in the climacterium, may give rise to heart symptoms. The heart annoyances which are associated with the normal processes and regressions occurring in the female genitalia may be dependent on neurasthenia or hysteria, or hereditary taint, on the basis of which neuroses of the heart develop. The occurrences in the sexual apparatus thus furnish the exciting factors. Ofttimes abnormal practices in the sexual sphere in the unmarried or the wedded, the exercise of the normal functions against one's will or inclination, or with an unsuitable partner; marriage to an impotent may exercise a powerful influence in starting neuroses or functional phenomena with associated cardiac annoyances."

Heart symptoms at puberty may develop for weeks or months before the first period. There is often an increased objective noticeable palpitation, often associated with vasomotor sensitiveness, blushing, tendency to pallor, tendency to fainting. There are cases where the pulse may beat 120 to 140. The symptoms usually occur in attacks, sometimes daily, sometimes at intervals of several days. When the period begins the attack disappears, usually recurs at the following periods in milder

form (hyperthyroidism?) Kisch describes paroxysmal attacks of tachycardia with very rapid pulse, which occur sometimes before the first period, and then each time before every following period, and may last several months after the establishment of regal and menstrual periods. These cases show an increased irritability of the sympathetic. In these cases there is neither anemia or chlorosis. In certain cases the above-mentioned heart symptoms and vasomotor disturbances occur before each period. Noticeable irritability of the heart at the time of menstruation is observed in most girls suffering from hyperthyroidism. The thyroid is then swollen. (See pages 375–378.)

It must be remembered that the heart makes its greatest increase in size at puberty. In nervous girls, especially with severe annoyances, before the occurrence of genital bleeding, the increase in pulse is more noticeable, and may be associated with palpitation. On the occurrence of bleeding the pulse returns to the normal, unless there are attacks of dysmenorrhea. In all cases masturbation must be considered as a possibility in the production of the palpitation or the nervous phenomena, or the congestions in the pelvis, which may be responsible for genital excitation or dysmenorrhea or menorrhagia. Entrance into the climacteric stage is often associated with numerous psychic disturbances, nervous unrest, fatigue, weakness of memory, no desire for exertion. In patients with neuropathic tendency the climacterium may start various psychoses. "Those patients suffer psychically in whom, as the result of a rush of blood to the pelvis or congestion in the pelvis, there is a feeling of weight and discomfort, and where frequently sexual excitement occurs, especially if not gratified." Attacks of tachycardia are sometimes very annoying. It is certain that there is a close connection of such vasomotor symptoms with the processes of involution in the genital tract, especially with the failure of the ovarian secretion in nervous cases and sexual cases. There is often an increased libido sexualis. The libido sexualis, for the greater part, no longer needs a peripheral physical stimulus. It is strengthened by memory pictures, and for that reason may persist a long time.

Many cardiac neuroses are due to abnormalities in the act of

cohabitation. Cardiac pain and palpitation are often present without any evident cause. Herz of Vienna studied the consequences of abnormal sexual relationship. Coitus interruptus and abnormal coitus, incomplete coitus, etc., leave the participants dissatisfied, nervous, irritable, and in a state of mental unrest, because their sexual inclinations are diverted from the natural course of progression, which is absolutely essential for the complete satisfaction resulting from the normal use of this function. The two important symptoms are: (1) pain, generally below the mamma, stationary and which accompanies deep inspiratory effort, variable in intensity and duration; (2) palpitation of the heart, a common symptom, which is always subjective. The subjective complaints may consist of simple heart consciousness and are not aggravated by exercise. Auscultation is negative. Sleep is restless, and is usually disturbed by dreams of persecution or of a sexual character (J. Gutman).

This occurs because of incomplete or abnormal coitus. It may occur in ungratified individuals. It also occurs in unfortunate matings, whether the result of age, habit, or passion. It should be considered wherever there is a suspicion of unsatisfied longing. It is always possible in many of these cases that the thyroid or the isthmus are enlarged. How much hyperthyroidism has to do with many of the cases must be a matter for consideration in each individual case. That this is very often true must be recognized from the effect which sexual conditions are known to have in Basedow's disease.

Palpitation, associated with dyspnea, headache, dizziness, heart pain, may be associated with coitus. These annoyances may result from continued *congressus interruptus*. The important thing is the impossibility of a normal ending of the orgasm. There may be added neurasthenic symptoms, especially of a depressive nature. Finally, tachycardia, dizziness, weakness, precordial anxiety, may occur independent of congressus. There may also be backache, a feeling of drawing and weight in the pelvis, which may extend into the legs, together with objective symptoms of hyperemia of the genitalia.

"In individuals castrated during the early years the libido sexualis does not exist unless there has been a preceding somatic psychosexual puberty. Has there once been an awakening of

the sexual desire or instinct, or has there occurred the actual experience of it, then the memory picture obtained thereby (the so-called libido centralis) works against the disappearance of the sexual desire after castration. For this reason, the majority of cases of castration find little difference in libido."

The Freudians believe in the very great importance of the sexual factor in the psychoses and neuroses, and they explain this great importance by the equal importance which the sexual plays in the mental life of every individual. They believe that there is no other one factor in mental life that is so dominating; no other one factor that has associated with it such tremendous emotional values; that it predominates even over the instinct of self-preservation (White).

Every child is an egoist and a sensualist during a period before clear thought begins and verbal language is used. Every child occupies himself in dealing with a body of sensations, some of which he finds strangely pleasurable and longs to reproduce (Putnam).

"Dreams are representations of suppressed impulses. The dreams of children, and many dreams of adults, are frankly sexual, but their suppression is usually so vigorous that one's natural desires are not permitted to express themselves even in dreams. If the suppressed desires could so disguise themselves that they did not shock us, they could often succeed in presenting themselves to us. This is the origin of symbolism in dreams. The impulses which seek to express themselves through this symbol will always be of two kinds—wishes or fears. Dreams represent the working out of unfinished problems" (Scripture).

Every dream contains the hidden fulfillment of a repressed wish, which usually refers to the two great impulses, hunger and love. Freud has shown that certain episodic manifestations of hysteria are simply substitutive gratifications for abandoned masturbation, and it is held that the same holds true for the hysteric dreamy state. Freud says that the contented individual does not indulge in fantasies, and dreamy states represent the individual's wishes. Brill believes that there is a direct relationship between suppressed sexual activities and fantastic day dreams (Brill).

ABERRANT BASEDOW'S DISEASE; HYPERTHYROIDISM

Among the symptoms of Basedow's disease are: tachycardia, palpitation, nervousness, weakness of the lower extremities, weakness of the voice, depression, changes of disposition, headaches, vertigo, insomnia, well-known disorders of the stomach and intestines, itching, vesical irritability, all the symptoms intensified in the morning, sensation of so-called inward trembling.

Functional derangement of the nervous system occurs in Graves' disease with a greater variety in the individual symptoms than in any other complaint, not excepting hysteria. The nervousness has much the character of mental agitation, not unlike that accompanying a sense of fright. With some it takes the form of pure depression of spirits, worse in the morning. McCallum says: "Early in the disease the patients feel themselves to be irritable and excitable. Their friends observe a change in disposition very different from that observed in the development of myxedema. Instead of becoming sluggish and apathetic, with all the mental faculties dulled, these patients are occasionally susceptible to every outward stimulus, and the mental reaction is a relatively intense one. In some respects this receptive and reactive state may resemble in a mild way that seen in the maniacal stage of the maniacal-depressive insanity. A feeling of anxiety dominates the mental state and the patient becomes the prey of groundless fears. Insomnia may be persistent, much to the exhaustion of the patient."

Möbius says of Basedow's disease: "Beside the picture rich in symptoms stand the aberrant forms, in which often only some few symptoms are demonstrable, and probably the extent of these aberrant forms is much greater than is generally supposed."

When the typical symptoms of exophthalmos, goiter, tachycardia, and tremor are present, a correct diagnosis is, of course, readily made. This grouping of typical symptoms is by no means always present. There are many cases of Basedow's disease without exophthalmos or without goiter, or without either. This point is important, because it facilitates a correct diagnosis of many cases of ill health, the true nature of which is often not suspected. These patients, as W. H. Thomson says, are rated as hysterical, neuralgic, neurasthenic, rheumatic, or dyspeptic.

"Recognition of the fact that Graves' disease may occur without exophthalmos and without goiter will result in the proper treatment of the numerous class who have Graves' disease only in an incipient or mild form, characterized by dyspeptic symptoms with headaches, neuralgias and nervousness, and persistent tachycardia" (Thomson). Yet even tachycardia is not always present.

There is a marked resemblance existing between "hysterical symptoms" and "neurasthenic symptoms" and those symptoms belonging to mild or aberrant forms of Graves' disease. These conditions must be differentiated from the irregular forms of Graves' disease. It is certainly difficult to make this differentiation from the milder forms. In those cases of Basedow's disease in which the typical symptoms are absent it is more than probable that the diagnosis of hysteria or neurasthenia is frequently made.

THE CLIMACTERIUM

A slight change in the sensitiveness of the vasomotors is a physiologic accompaniment of the climacterium. In association with the various forms of climacterium heart symptoms the vasomotor symptoms never fail. Flushes followed by pallor, perspiration, spots before the eyes, dizziness, tendency to fainting, buzzing of the ears, may in some cases cause an irritability of a general nature with manic and depressive symptoms. Those patients suffer psychically in whom, as result of a rush of blood to the pelvis, there is a feeling of weight, discomfort, and frequently sexual excitement. Attacks of tachycardia are sometimes very annoying. It is certain that there is a close connection with the processes of involution in the genital tract, especially with the failure of the ovarian secretion, as an explanation for the climacteric heart annoyances. It may not be this alone, there may be changes in other glands with an internal secretion.

Generally at the forty-fifth year entrance into this stage is often associated with numerous psychic disturbances, nervous unrest, fatigue, weakness of memory, no desire for exertion. In patients with neuropathic tendency the climacterium may start various psychoses. There is often an increased sexual desire.

The libido sexualis no longer needs a peripheral stimulus, but is strengthened by memory pictures, and for that reason may last a long time. A very frequent early symptom is the falling asleep of the arms and legs. Many women complain of rheumatic or gouty pains in the extremities, back, and sacrum, which is etiologically connected with the diminution of the genital function (pseudo gout). At this time there may occur changes of the skin, pigmented spots on the face, growth of hair on the upper lip, the growth of warts, occurrence of arthritis deformans. We must not overlook the Heberden nodes, small nodules up to the size of a pea, found especially on the proximal area of the last phalanx.

In the climacterium the woman recognizes her diminished sexual value. In the period of full development of genital life the sexual instinct expands, the instinct for conception and propagation rises to full heights, and after the period of cohabitation and activity there comes a period of rest, diminishing down to passiveness. At the pre-climacteric period and in the beginning of the climacterium there is awakened desire and increase of the libido sexualis. Certain pathologic symptoms which appear at the period of the establishment of menstruation, and which diminish or disappear from the field during the period of regular sexual function (such as heart annoyances, dyspnea, psychic neuroses, chlorotic states, albuminuria, skin lesions, etc.), arise again to full force at the time of the climacterium. In fact, so certain is this condition, according to Kisch, that *the character of the climacterium may be fairly well predicated from the peaceful, the irregular, or the disturbed general condition which existed at the period of puberty and the establishment of menstruation.*

Healthy women who lead a wholesome life, who are well nourished and free from distressing influences as girls, who practise normal sexual relations, possess a longer period of genital life than women in opposite conditions. It is a sign of decadence when the well-to-do classes evidence a short duration of the sexual life. Hygienic and ethical life is associated with lengthening of life as a whole, as well as with the lengthening of the sexual activity of woman. The failure of culture and ethics brings a shortening of the period of sexual power. This holds true for the individual,

for the family, and for peoples. Healthy women whose sexual organs are functionating normally, who have borne several children, who have nursed them, usually have a longer duration of the menstrual function than those under contrary conditions. Weak, debilitated women have a shorter period of sexual life. Mental irregularities and annoyances occur as a result of the early disappearance of the menstrual function. Chronic inflammatory diseases of the uterus and adnexa shorten the length of the sexual life.

Many patients with nervous symptoms come into the hands of the gynecologist at that period of life which closely approximates the time of normal menopause or climacterium. Many of these patients are ceasing to menstruate, either gradually or suddenly, and attention is naturally directed to the possible arrival of the critical period known to the laity as the "change of life." When, however, patients of this kind are still menstruating, or are menstruating more profusely than usual, this possibility is not sufficiently considered. On the other hand, this is the period in which various conditions are prone to produce not so much hysterical as neurasthenic symptoms. In many instances the symptoms are not those of the supposedly typical climacterium, and for that reason a differential diagnosis is rarely attempted. It seems that we find at this period of life two classes of cases: Those which may be considered as excitable, and cases which may be considered as melancholic or depressed. Those of the excitable class conform more closely perhaps to the usual picture associated with the change of life. It must be noted that after castration the same division into two classes is observed: (1) the excitable, and (2) the depressed. In not all instances are the vasomotor symptoms present, nor are palpitation and irritability always observed. It is certainly easy in the form associated with depression to make the diagnosis of neurasthenia or nervous prostration. Although at this period of life, and perhaps more so than at others, true neurasthenia does occur, nevertheless many of these cases are probably such as are produced by a diminution of the ovarian function. The frequent development, in the predisposed, of a true psychosis at this period must not be forgotten.

According to Fehling, the evidences which accompany a natural

menopause are congestions, flushes, sweatings, which have a tendency to disappear after one-half to one year; they sometimes last for years. There may be superimposed palpitation, dizziness, stomach and intestinal annoyances, a feeling of flatulence and distention, neuralgia, especially costal, sleeplessness, an anxious feeling, mental unrest, nervous irritability.

It is important again to mention the fact that cessation of the menses is generally considered an essential evidence of the climacterium. This is not so. One of the important complications of the climacterium is great uterine bleeding, regular or irregular in its occurrence. With these bleedings the essential constitutional and nervous symptoms of the climacterium may be present, even if not in full force. Because of the presence of the bleedings, the fact that climacteric symptoms may nevertheless be present is generally overlooked, so strong is the idea that only a cessation of menstruation is proof of the onset of the climacterium.

During the natural climacterium the annoying symptoms are generally worse in those patients in whom atrophic changes in the uterus occur rapidly, while they are less annoying if these changes go on slowly. The patients who have irregular and profuse bleedings often, but not always, suffer less from the annoying constitutional and nervous symptoms.

Castration.—That the ovarian secretion is not always of essential importance is evidenced by the fact that a goodly proportion of women go through the menopause without noticeable disturbances, and that a large proportion of the operative cases have little or no annoyance. The same variation in degree, in intensity, and in the duration of symptoms as is observed in the natural climacterium is likewise observed after surgical castration. The disturbances after operation are at first mainly of a vasomotor nature, and are accompanied by psychic unrest.

According to Martin, the symptoms after castration are rushes of blood to the head, combined with a feeling of anxiety. There is often added thereto palpitation, dizziness, tinnitus, sweating. These symptoms occur in various combinations, often repeated several times a day. Continuation of these conditions leads to a feeling of weakness, to headaches, sleeplessness, etc. The symptoms usually improve after two or three years, but sometimes

continue for five or six years. These states result from absence of the ovarian secretion.

Fehling says that psychic disease is seldom noted. The symptoms are worse in women formerly neurasthenic or hysterical.

After surgical castration, even in the severe cases, the body eventually becomes accustomed to the absence of the ovarian secretion, probably through atrophy of the thyroid. The fact that many cases have few or no symptoms at all shows that the same variations are observed after castration as are noted in the menopause occurring along normal lines.

Glaevecke says that castration develops an artificial climacterium, which in all points resembles the natural, and the female enters through the castration prematurely into the climacteric stage. "Castration cuts deeper into the general organism of the female than does total extirpation, and we must rate the mutilating effect of the first higher than the latter. Very noticeable are the changes in the mental sphere, where we generally see a depression of temperament, which is often increased to marked melancholia, and in these cases may go on to a real psychosis."

On the other hand, Pfister claims that "the so-called mutilation (of castration) should not be rated so high, in that the influence which the female ovary exerts on the female organism is much overrated."

Altherthum, too, says: "The complete removal of the ovaries does not at all produce the injurious results upon the mental and physical condition of the female that have been generally accepted."

Abel says that "after removal of the uterus the ovaries enter into a more or less rapid atrophy, which causes, before the age limit of the natural climacterium, a complete disappearance of ovarian function. It is certain that after removal of the ovaries we see at once all the physiologic accompaniments and anatomic consequences of the climacterium developing in a relatively short time, more immediately and sharper than they generally take place at the natural age limit. This is not so after the removal of the uterus alone. Here the transition is more natural and milder."

The symptoms which may occur with either natural or artificial menopause are mainly the following: (1) Flushes, with or without reddening of the skin, frequently followed by a sensation of cold

and sweating; (2) palpitation of the heart; (3) dizziness; (4) headaches; (5) sleeplessness; (6) disturbances of digestion; (7) irritability of temper; (8) tendency to either mental depression or excitement; (9) various "nervous" manifestations, especially psychic unrest; (10) psychic disturbances.

According to Baruch and others, the annoyances after castration are most marked in nervous and hysterical women. They find it hard to distinguish in such patients between their former "nervous symptoms" and those which are due to the menopause.

Mainzer, in the clinic of Landau, found that disturbances in the vasomotor system resulting after castration disappear upon the administration of ovarin; that disturbances at the natural climacterium are benefited; that the results in primary or secondary amenorrhea are satisfactory, but that no effect is exerted upon general hysteria.

Theory of the Climacterium.—In the study of the symptoms of the climacterium, either natural or artificial, I have long been accustomed to consider many of these cases as instances of what I have termed "relative Basedow's disease," because the symptoms resembled to a considerable degree the symptoms of Basedow's disease. The more important reason was the fact that I considered the symptoms of most of the climacteric cases to be due to relative hyperthyroidism. Since Basedow's disease is considered to be due to hypersecretion of the thyroid, the term "relative Basedow's disease" seemed an apt one.

It is certainly remarkable that the great majority of cases of well-defined or aberrant Basedow's disease are observed in women. To say that an affection of the ovaries is in a degree responsible for the genuine cases would be going rather far. The least that we can say, however, is that women are extremely prone to morbus Basedowi, probably because they possess ovaries.

If cessation of ovarian secretion means unopposed thyroid activity, as seems evident from the symptoms occurring at menopause and after castration, there is no reason why disturbances of function on the part of the ovaries may not be responsible for forms of "relative hyperthyroidism" and "relative Basedow's disease."

When the ovaries are removed at operation, the vasomotor and other disturbances which come on resemble more the symptoms

of hyperthyroidism than any other condition of which we have any knowledge. *In women who have not been operated on, in women at menopause or climacterium, and often in women who are not near the menopause age, we frequently see annoyances of the same nature, often combined with scanty menstruation and with the other evidences of ovarian insufficiency.* Are we not justified in considering the relative oversecretion of the thyroid in them, too, as the pathologic basis?

According to Welles, the close relation between the thyroid and the reproductive functions is beyond question. The points in favor of these are the following: (1) The greater size of the thyroid in females; (2) the enlargement of the thyroid in menstruation and pregnancy; (3) the tendency to develop goiter during pregnancy; (4) early atrophy of the thyroid after the menopause; (5) loss of sexual appetite in many of the thyroid diseases; (6) 80 per cent. of all goiters, 80 per cent. of myxedemas, and most cases of Graves' disease occur in the female; (7) Halsted observes that bitches that have lost part of their thyroids, when impregnated show evidences of athyreosis as the time of parturition approaches, which disappears soon after the litter is born; (8) all of the pups of these litters have thyroids many times the normal size; (9) "even in dogs, if they are old, thyroidectomy is neither fatal nor accompanied by the usual symptoms; Kocher points out that post-operative myxedema scarcely occurs at all in elderly people" (Thomson).

Thomson explains the frequency of Graves' disease in women "by the proneness of women to gastro-intestinal derangement in connection with menstruation and pregnancy and menopause." In our opinion it is just at these three stages that ovarian inactivity or insufficiency and ovarian relation to the thyroid would produce the annoying combination of nervous symptoms easily mistaken for hysteria or neurasthenia and resembling or actually representing aberrant forms of Basedow's disease. Even if Thomson is correct in his statement, we must still reason out what makes women prone to gastro-intestinal disturbances in connection with menstruation, pregnancy, and menopause. May not the proneness to gastro-intestinal disturbance be the result of the metabolic changes which occur at menstruation, pregnancy, and menopause? And if they are the result of the metabolic changes, then what more rational

idea have we than that ovarian and thyroid interrelation, always of a fluctuating rather than of a stable character, produces through hyperthyroidism and also hypothyroidism not alone annoying nervous symptoms, but innumerable variations in the severity of the symptoms?

Perhaps in the climacterium the annoying nervous symptoms are less if the thyroid atrophies coincidentally with the ovaries, and perhaps the symptoms are more annoying if the thyroid atrophies more slowly than the ovaries.

Perhaps in the climacterium the excitable cases are those with too much thyroid, and the depressed ones with too little.

Possibly after operations the thyroid atrophies on absence of the ovaries, quickly in some cases and slowly in others, as probably happens at the normal climacterium. The patients grow stout, probably because the ovarian, and later the thyroid secretion, no no longer stimulates tissue metabolism; in some cases possibly because, the thyroid secretion being diminished or non-functionating, there is a "relative myxedema."

The probabilities are that ovarian insufficiency in many cases means relative hyperthyroidism. The least we can say is that the symptoms resulting from diminution or absence of ovarian secretion, and the symptoms of hyperthyroidism, are sufficiently alike to express the opinion that they are one and the same.

Administration of Thyroid Extract.—It is of interest to follow the action of thyroid extract, particularly in patients who have lost both ovaries at operation. Among such cases there are those who suffer absolutely nothing annoying after the castration. There are others who suffer in a mild degree and others in a very marked degree. In administering thyroid extract to some of these patients, I have observed that in the first class there are produced some flushes and some irritability, but no marked results. In the second and third class of cases, each and every one of the annoying symptoms is markedly increased. So noticeable is the sensitiveness to thyroid, and so marked is the increased severity of the symptoms, that one can scarcely doubt that hyperthyroidism is the cause of the symptoms in the first instance.

On the other hand, the moment the thyroid extract is stopped and the patients are again put on ovarin, the annoying symptoms cease and almost entirely disappear. I have administered ovarin

and followed its action in over forty cases of double oöphorectomy, with or without loss of the uterus, and have in only two cases failed to observe an almost entire absence or disappearance of annoyances, especially if the ovarin was administered soon after the operation. On the other hand, I have not been able to secure the same brilliant results by the administration of ovarin in cases of natural menopause or climacterium, as have been published by other authorities. Yet I have seen enough of its beneficial, though slower, effects to feel satisfied of its specific action.

After castration the reduction of oxygen exchange amounts to 20 per cent., the general gas exchange being likewise diminished; the weight, as a rule, increasing. The effect of ovarin, if given within two or three months after castration, not only overcomes this change, but increases the gas exchange above the normal, this increase lasting a variable time and diminishing gradually. On normal animals no effect is observed. The use of preparations obtained from the male organs exerts no effect on the female deprived of ovaries.

We must remember that ovarian extract has the effect of increasing oxidation, and perhaps of increasing the elimination of waste products, and the good results might be explained on this ground, were it not for the specific action of ovarin when administered after castration. Thyroid extract, as is known, increases oxidation, and especially aids elimination, and produces marked metabolic changes. This may account for the good effects obtained by the administration of thyroid, even in certain conditions in which one would naturally expect thyroid to act injuriously. Good results have been published very generally on the administration of thyroid in simple struma. Many have published good results from the administration of thyroid in Basedow's disease, and, as is well known, numerous cases of obesity react beautifully to the careful administration of thyroid extract. On the other hand, several exact observers, while acknowledging the value of thyroid extract in simple struma and obesity, have noted absolutely no beneficial influence in cases of Basedow's disease. Most of us know that thyroid extract almost always increases the annoyances associated with exophthalmic goiter. The beneficial effect of thyroid extract in certain mental diseases is explained on the

theory that the metabolic and other changes which it produces in the brain cause a reaction, which in some instances is beneficial. On the other hand, as might be expected, numerous cases are uninfluenced or harmed thereby, especially if in them the element of hyperthyroidism is present.

Hypothyroidism.—Neurotic symptoms are often suggestive of myxedema and are curable by thyroid. In myxedema patients are depressed almost to the verge of melancholy, without the self-accusation and despair of true melancholia. They are sluggish in their thought, unable to remember recent events, indifferent to their surroundings, without interest in personal and family affairs. They take an unfavorable view of their own condition; their will power is impaired. There is a mental inertia; they are inclined to be sleepy, and often sleep heavily both day and night, and awake without any sense of refreshment.

Physically there is a dryness of the skin and hair; the skin does not perspire, it becomes pigmented; the hair falls out or becomes gray. The surface of the body is cold; the hands and feet are always cold. Appetite and digestion are impaired. There is an interference with the calcium metabolism. There is a progressive gain in weight. There may be constant pain in the muscles and bones. (Levi of Paris says that in many cases of chronic rheumatism thyroid treatment is the best.) When nervous or neurasthenic patients complain of such symptoms one grain of thyroid twice a day, added to the other treatment, is of value. In ten days the effect should be evident in less dryness of the skin, in relief from the sensation of cold, and in the decided improvement of mental activity.

Mental sluggishness in young girls with symptoms resembling dementia præcox, and considered as cases of weakmindedness, may obtain mental activity by thyroids. The symptoms are not enough to warrant the diagnosis of myxedema, but the dry, scaly skin, dryness of the hair, and coldness of the body suggest the use of thyroid extract (Starr).

Hyperthyroid States.—We observe in women who are not near the climacteric age, in women who have local disturbances of various natures, and in women who have none of these local disturbances, symptoms of very much the same character

as are typical of the climacterium, either natural or artificial. While the flushes are not marked or are absent, yet these women have palpitation, irritability of temper, mental depression, psychic unrest, dizziness, sleeplessness, and intestinal disturbances. It is these points which have given rise to the diagnosis of reflex neurosis, neurasthenia, hysteria, etc. It is fair to suppose that in many of these cases we are dealing with aberrant forms of Basedow's disease, or with ovaries which are either not producing a positive secretion that is needed, or which are not producing a proper secretion to nullify such other substances as are able to produce the symptoms that occur in the climacterium, natural or artificial. In many cases a comparison of the symptoms with those of the climacterium, and with the symptoms of aberrant forms of Basedow's disease, had led me to believe that they, as well as the typical annoyances of the climacterium, are due to hyperthyroidism. It is very often hard to distinguish between many forms of "nervousness," on the one hand, and slight or aberrant forms of Basedow's or Graves' disease, on the other.

In only a few of these cases is there persistent tachycardia, but in all, at various times, one or other of the cardinal symptoms have become markedly noticeable. In all of them the mental irritability, the tendency to magnify slight details, the mental unrest, the sleeplessness, palpitation, attacks of weakness, etc., are like the symptoms of the climacterium. From our knowledge of this condition we must consider the etiology to be a relative degree of hyperthyroidism.

That the condition of hyperthyroidism may occur in patients without marked pelvic involvement is self-evident. If it may occur in such cases, there is more warrant for accepting a like condition when ovarian function is disturbed by pelvic disease of a circulatory or inflammatory or atrophic nature, such as cases of Freund's disease.

It would be strange if gynecologists had attributed, entirely without reason, to pelvic disturbances so many constitutional and nervous symptoms in women. They have attributed them perhaps too much to these pelvic disturbances acting through reflex channels. There is certainly a large proportion of women suffering from so-called reflex symptoms who cannot be classed under hysteria or

under neurasthenia, but in whom ovarian insufficiency or relative hyperthyroidism is probably present. It is often a difficult question from the standpoint of diagnosis, but the predisposition of the female to various combinations of nervous symptoms certainly points to a general state as the causative factor.

The relation of the ovaries to normal functions of a special character in women is decidedly clear; their relation to pathologic nervous states is highly probable. The weaker sex, with its tendency to these affections and to hysteria, will probably in the future be less frequently treated as possessors of nerves alone. It is not probable that ovarin replaces all that the ovaries should furnish, nor can ovarin in a short time overcome injuries long existing. That its action in the above-mentioned affections, supporting the theory of ovarian and thyroid interrelation, may lead to a more rational treatment of certain nervous conditions in the female, both medically and surgically, is not to be doubted.

Realizing the relation of the ovaries to many of these nervous conditions, we may say, in the words of Virchow, "All peculiarities of the female body and mind, or nutrition and nerve function, are only a dependent of the ovary."

HYPOPHYSIS DISEASE

(1) Hyperactivity of the anterior lobe gives rise to skeletal overgrowth—possibly to hypertrichosis and certain cutaneous manifestations—in brief, acromegaly. (2) Hypoactivity of the anterior lobe is evidenced by preadolescent failure of development in the osseous system and secondary sexual characteristic, etc. (3) Hyperactivity of the posterior lobe causes lowered nutrition and a decrease in carbohydrate tolerance, moist skin, etc. (4) Hypoactivity of the posterior lobe leads to adiposity—higher carbohydrate tolerance, subnormal temperature, somnolence, dry skin, polyuria, polydipsia—in short, the opposite symptoms to the above.

With hyperpituitarism temperamental changes are often apparent with wakefulness, lack of concentration, indecisiveness, irritability, distrust; in other words, psychasthenic states which are not unlike those with which we are familiar in moderate ways

of dysthyroidism. When hyperpituitarism dates from early life, the individual is usually deficient in educational training from the outset.

With hypopituitarism there are gradations of disturbance, from mild psychoses to extreme mental derangement. There is inability to concentrate, there is impairment of memory. Former powers of mental activity may be restored, with the readjustment of a physiologic balance, through glandular administration. In most cases of hypopituitarism sufficient to cause adiposity, deviations from the normal intellectual level may be expected. There may also be drowsiness. Psychic disturbances of varying degree are common.

Starr finds that neurotic symptoms may be dependent upon disturbances of the hypophysis. Marked changes in the hypophysis cause (1) gigantism, or acromegaly, on the one side, and (2) a craving for sweets, a disturbance in carbohydrate metabolism, subnormal temperature, slow pulse, dry skin, loss of hair, suggestive of myxedema, and sexual infantilism is a marked symptom of this state. There is a complete lack of sexual desire and impotence. There are mental changes, such as lack of ambition, indifference to matters of importance, inability to do ordinary work, and a state of mind such as seen with chronic opium habit. The extreme forms are easily recognized. In so-called neurasthenics many minor conditions are probably due to disturbances of this gland. There is a type of neurasthenic who is fat, gaining in weight, has a lack of ambition, craving for sweets, and in all probability some of the nervous manifestations are due to the hypophysis. In two or three such cases of marked headache the use of pituitary extract has caused relief and has improved many of the nervous symptoms. These cases may also be improved by thyroid extract, which acts very much like hypophysis. Starr gives one or two grains a day for ten days, then an intermission of five days, and then again.

THE HYGIENE OF PUBERTY

The time when menstruation begins and stops, whether early or late, is often an inherited quality in many cases. It is wise to

develop the resistance of the body, which is diminished by the onset of menstruation, so that the girl may meet with greater ease the demands which this awakening sexual function makes. The girl should be nourished and hardened.

Nourishment.—The food should contain albumen and should be easy of digestion. There should be four to five meals each day. The food should consist of much meat, fresh vegetables, vegetables containing iron, such as spinach, beans, and peas. There must be freshly cooked fruit in large amounts. The evening meal should not be too rich or too succulent, and had best consist of eggs, omelet, milk, stewed fruits, etc.

Exercise.—There should be plenty of exercise in the open air; not much if the girl is chlorotic. Simple gymnastics develop the muscles, aid in erect carriage, and develop respiration, circulation, and digestion. Room gymnastics are of very great value, and such work may be done in the gymnasium, or the use of medico-mechanics may be advised.

Clothing.—Clothing ought to be of a kind which does not obstruct the circulation. Corsets for the young are injurious. Clothing must give freedom to breathing, to the thorax and abdomen. There should be no tight bands about the neck or tight garters, and underwear should not irritate the genitalia.

Sleep.—Eight to nine hours of sleep are sufficient and the rule to be followed should be "early to bed and early to rise."

Routine.—A regular routine of life and regulation of work and responsibility is advisable. There should be active walking in the open air. Not too much time is to be spent indoors or at the piano or sewing-machine. The use of the bicycle is not advisable, but lawn tennis, skating, swimming, etc., are permitted. Literature should be of a wholesome nature and the child must be watched to prevent the habit of masturbation.

Hydrotherapy.—At morning and night we advise a two-minute cold sponge, 50° to 70° F., or a cold shower-bath lasting half a minute. If the girl is anemic or becomes chilled, administer a glass of hot milk or tea some time before the use of the water. Cold water ought not to be used for chlorotics. Scrofular or rachitic constitutions demand the use of salt baths. These girls are poorly developed and menstruate little or late. Sea baths are of value.

It is wise to begin at home with salt baths and to gradually lower the temperature so that the girl may become accustomed to sea-bathing in the open air.

Climate.—The effect of climate in disturbances of menstruation and in nervous conditions, as well as in chlorosis, is very important. These states demand an elevation in the mountains of 3000 feet. This acts well on blood-formation and on menstruation, improves the appetite and digestion. If the pulse is irregular and frequent, if there is increased pressure in the arterial system, and if there is little resistance to fatigue, it is better to advise a medium elevation in a wooded country. In winter a mild climate is necessary for anemic and chlorotic girls.

The skin demands special care, for girls at puberty are often liable to acne, comedones, seborrhea.

In abnormal conditions of the pelvic organs a gynecologic examination should be made only when absolutely necessary, for it often has a bad effect on the psychic state. The girls imagine they are extremely sick. Gynecologic examination or treatment may cause erotic attacks and may end in a neurosis.

Education.—The social relations of children at puberty should be closely watched; girls are to be taught mild responsibility, and any tendency toward curiosity in the field of the sexual organs should be diminished. The literature, play, and amusements of growing girls should be observed, and social relations with the opposite sex ought to be controlled. They are not to be overburdened with mental work; there should be a careful combination of work and relaxation. They should be kept away from society, from the theater, from balls. Education is to be limited to the mental ability of each case. The mental qualities of associates should be noted. The girl at puberty must be kept from excessive religious enthusiasms. Literature of such a nature as does not spoil wholesome illusions is to be selected. Music, painting, etc., are to be considered simply as wholesome relaxations. Attention must be paid to the diet and physical exercise. The food should be of a mixed animal and vegetable nature, with little coffee or tea, with no alcohol. Attention paid to the proper daily evacuation of the bowels is essential.

Corsets, if worn, should not constrict the body and should not

contain bones, and must act merely as a support for the skirt. It is easy to support the skirt from the shoulders by suspenders.

In due time the young girl ought to be informed of her normal sexual processes and the meaning of this condition to health. She must be warned of its importance and its significance as a step in her normal life.

Care During Menstruation.—During menstruation the external genitalia should be washed twice daily with water at 85° F., and no full baths should be taken. Long walks, horseback-rides, dancing, etc., should not be indulged in. The menstrual period ought to be a period of rest and only simple easy work should be done. The bladder must be emptied regularly. Diet is to be wholesome and nutritious and free from watery foods, especially free of tea, coffee, wine, and beer. In chlorotics the diet must be extremely full for several days.

TREATMENT OF CHLOROSIS

In chlorosis feeding should be carried out every two or three hours. There should be plenty of albuminous food. Breakfast is to consist of meat, especially steak, zwieback, butter, tea, or coffee. Milk to the amount of one-fourth to one-half of a quart at each meal is to be given; more only if solid food is not well borne. There should be a rest of a half-hour before and after each meal. If girls are anemic and thin, there should be an increase of fats, such as milk, butter, and cream, and much carbohydrates, rice, potato purée, sago, tapioca, sweet fruits, dates, apples, chocolate, milk, and cocoa. Meals are to be given, say, at 7.30 and 10 A. M., at 4, 7.30, and 9 P. M. If girls are anemic and fat, which condition is often due to lack of exercise and to free feeding, albuminous food should be given and only small amounts of carbohydrates and fat. The amount of fluids ought to be small in order to thicken the blood and increase the hemoglobin.

During menstruation the diet should be actively pushed and should contain much albumen and fat and some carbohydrates. At 7.30 A. M. one-half quart of milk is to be taken slowly in bed. At 9 tea or coffee with milk, roast beef or steak, or chicken are given. At 11 one-fourth quart of milk, bread and butter, or

two eggs. Lunch consists of meat, vegetables, potatoes, plain dessert, fruit. At 4 P. M. coffee with milk, and bread and butter are taken. The feeding at 7 P. M. should be of the same amount as at lunch, or rather less in amount. Soups are to be avoided. If these patients do not care for meat, it may be substituted by milk, bouillon, fruit, cocoa, rice, etc.

In chlorosis too much exercise ought not be advised. In fact, in severe chlorosis rest in bed of from four to seven weeks is advisable. Tepid sponge-baths should be given morning and night. Sweat-baths are said to increase the number of red blood-cells, the hemoglobin, and the body-weight. Hot baths three times a week at a temperature of 105° F., and of a duration of fifteen minutes to a half hour, are of value, especially if followed by a cold douche lasting only a few seconds, or by a cold rub. This must be followed by a complete rest of one hour. These hot baths are to be continued for a period of from four to six weeks. They have a tendency to improve all the annoying symptoms. Nauheim baths are especially valuable for chlorosis or anemia. They are of importance because they can be given at a lower temperature than other baths. They act on the nervous centers and influence metabolic processes. They ought to be given at a temperature of from 90° to 95° F. and of a duration of ten to twenty minutes (Kisch).

Of great importance is the care of the intestines, and their action must be regulated. It is advisable, once a week, to administer at night a blue-mass pill, 3 to 5 grains, to be followed the next morning by a saline cathartic. Iron is the specific in the treatment and is used in the form of Blaud's pills, ferratin, or any of the numerous iron preparations, such as ovoferrin. Ovarin is of value as an aid to iron and ought to be administered in all cases. A combination which I use consists of a capsule taken three times a day after meals containing ferri carbonas, 3 to 5 grains; arsen-hemol, 1½ grains; ovarin, 3 grains; extract of cascara, ½ to 1 grain. Arsenic in the form of Fowler's solution may be given with ferromannin.

℞. Massa Blaud's (Fischer's)..... gr. v
Acid. arsenos..... gr. $\frac{1}{10}$
Ext. nuc. vomic..... gr. $\frac{1}{4}$
Ext. casc. sagrad..... gr. $\frac{1}{2}$
M. Ft. tal. caps. no. xxx.
S.—One p. c.

℞. Liq. potassi arsenitis..... ℥iss
Ferro-mannin..... ℥vi
S.— ℥ij t. i. d. p. c. (Goodhart.)

℞. Ovarin (Merck)..... gr. iij
Arsen-hemol..... gr. iss
Ferri carbonatis..... gr. iij
Ext. cascara..... gr. ss
M. Ft. tal. caps. no. xxx.
S.—One t. i. d. p. c.

TREATMENT OF NERVOUS CONDITIONS

Conditions associated with *diminished excretion of urea* demand care in the choice of diet. Red meats are to be excluded and only selected vegetables and fruits are to be permitted. I have obtained good results by following the practice of William H. Thomson, who administers blue mass, 5 grains, once a week at night, and who advises the administration of sodium phosphate every morning in hot water and 10 grains of sodium benzoate after each meal. In addition to that, he advises the administration of tincture of aconite for a period of two weeks, followed by the use of nitroglycerin.

In the treatment of *onanie* the greatest difficulty is experienced. Not infrequently, when examination is possible, proof of the existence of this habit is given by observing hypertrophy or elongation of one or both labia, a condition to which Dickinson has called attention. This alteration is produced by either manual touch of the parts or by rubbings in the seated position with the legs crossed. There is often seen a granular moist condition of the small labia and the vestibule is covered by a clear, moist, mucous secretion, and from the vagina comes a hypersecretion of cervical mucus. The condition is by no means infrequent in married women. There is great difficulty in questioning patients, and suggestions as to its avoidance are not calmly taken. However, patients should be made aware of this condition and its dangers should be pointed out. An active physical life should be advised, muscular exercise should be ordered, and outdoor sports, especially tennis and swimming, are to be recommended. Horseback-riding and the use of the bicycle should be avoided.

In married women a condition allied to this is furnished by *coitus interruptus*, a procedure which produces pelvic congestion and nervous excitement, sometimes of marked nature. In addition,

this condition causes congestion and hyperemia which not infrequently result in profuse menorrhagia or metrorrhagia. On the correction of this abnormal sexual practice and the regulation of the process the symptoms, not alone general but local, often improve. We cannot attribute, however, nervous states in women to this factor alone. We must take into consideration a neurasthenic or hysterical basis, and the desires and repulsions in sexual relation. A nervous predisposition is aggravated by coitus interruptus and by onanie.

Retroflexions and retroversions *per se* cause little annoyance save, perhaps, backache. When they are associated with other pain, some associated condition in the adnexa is the responsible factor. Acquired retroflexions are the result of labor, and when they "produce" nervous or other symptoms, the retroflexion is usually found to be part of a general ptosis. With this splanchnoptosis there is associated a general asthenic physical and nerve state, and there is undue reaction to all stimuli, both subjective and objective. Patients with a psychopathic predisposition suffer most from this general asthenia of subinvolution.

The treatment of *general subinvolution* is discussed under that special section. In some cases it demands an Alexander-Adams or other operation. In addition, it demands the use of general tonics, especially strychnin and the hypophosphites, attention to the bowels, the wearing of an abdominal belt, abdominal massage, the sinusoidal current, and a course of carbonated saline baths. The use of ovarin is always advisable. In some instances associated with marked physical and mental asthenia a modified Weir-Mitchell cure is of value.

Local treatment for tangible lesions should be practised unless contraindicated by excessive nervousness of the patient.

Dysmenorrhea, fluor, pain, pruritus, onanie, deserve our most careful attention. The treatment of these conditions by no means always causes a disappearance of existing neuroses or of vasomotor or psychic disturbances. The correction of pathologic changes, especially such as have seemed to cause the general nervous state, are advisable and valuable procedures, but must be associated with general treatment of the nervous condition.

Backache, pelvic pain, leukorrhea, etc., are troubles of which the

patient is conscious. In nervous women auto-suggestion may cause a marked reaction to such annoyances; patients magnify the significance of the condition and many become so introspective in their study and thought of their pelvic state as to feel absolutely certain that only operative cure of the local annoyances will restore their nervous systems to the normal.

On the other hand, if patients of a nervous type are made aware of the existence of a movable kidney, of an enteroptosis, of a retroflexion, of a lacerated cervix or erosion of the cervix, and if the physician attributes to these alterations the causation of the nervous symptoms, the physician by ectosuggestion often aggravates the patient's nervous state by fixing her attention on a local condition which has nothing to do with her nervous symptoms or which is often only part of a general state.

Pain must be relieved, for nothing so depresses the tone of the nervous system, aside from its bad effect on appetite and sleep. Long-continued pain wears down the nerve resistance of the patient. Backache and headache may be due to constipation or to diminished excretion of urea or to conditions which may be relieved by the administration of aspirin, vini colchici, iodid of strontium, ergot, or the glycerophosphates. For temporary relief or for the relief of hemicrania or pain in any part of the body increased during menstruation, the coal-tar products, as prescribed for dysmenorrhea (p. 238) are the best. Pelvic pain and backache often yield to local treatment for pelvic inflammations, congestions, and ptoses. If a cause cannot be felt bimanually, pain is often referred to neurasthenia or hysteria. This is a great error and does innumerable patients injustice. It does take slighter alterations to produce annoyance in patients who have a predisposition to nervousness or to mental asthenia or whose life has been such as to produce a lack of nerve tone, but almost invariably there is a responsible concrete factor which is productive of pelvic pain and backache. If pelvic pain fails to yield to treatment, operation is often necessary for the removal of the cause before the nervous condition can be relieved. This refers especially to ovarian pain, where *removal* of the ovary, tube and varicosities is often the only cure.

Ovarian neuralgia is benefited by warm baths, warm applications to the abdomen, blisters applied to Morris' points, and warm

vaginal douches. If the ovarian neuralgia is a symptom of neurasthenia or hysteria (?), the primary condition must be treated. If the pain is severe, hypodermic injections of antipyrin may be used if the internal administration of the coal-tar products brings no relief. The hypodermic use of morphin should be avoided if possible. Electricity is sometimes of value (p. 121).

In *nervous and neurasthenic conditions* alcohol, tea, and coffee should be avoided. Much leisure should be spent in the open air and exercise should be advised and kept up as a habit. Weighty responsibility should be avoided. In severe cases absolute rest is an essential in treatment. Reading and mental exertion should be avoided. The diet is to be light and easy of digestion and the bowels should be carefully regulated. In acute cases a nurse should be in charge of the patient. Isolation, according to Clarke, is at first not necessary, but if the patient does not improve, isolation and treatment away from home should be advised. Gentle rubbing of the whole body or the sheet-bath once or twice a day is valuable. A small dose of alcohol may sometimes relieve nervousness and promote sleep. For insomnia a sheet-bath is given in the evening. Hot sponging to the spine or a wet pack is of value, to be reinforced, in case of failure, by drugs. For the sleeplessness and excitement baths of 85° to 95° F. are restful. Care must be taken to avoid sleeplessness becoming a habitual complaint, and drugs such as bromids, chloral, trional, sulphonal, and veronal must be used, but not too long. In severe cases a Weir-Mitchell treatment is advisable. The diet should be full and nutritious and readily assimilated. Of the electric currents, the sinusoidal is excellent in many cases which are not severe enough to demand absolute isolation. If the condition of the patient is phlegmatic and psychic irritation is not marked, a course of Nauheim baths is often of the greatest value in rousing and stimulating the patients, mentally and physically. Change of air and scene is of great benefit. Air at not too high an elevation is good. In individuals of an irritable nature climate of even temperature is better, while in the phlegmatic type an elevation with stimulating air is good. Massage is excellent in many cases. Among drugs arsenic is of value, also valerianate of zinc in pill form, with a small dose of quinin and iron; compound syrup of hypophosphites; the

glycerophosphates. Residence in the country, a quiet country life, exerts a soothing influence, and is one of the most useful means of treatment.

The bromids are very essential in excitable states, for nervous and genital excitement, for nymphomania, onanie, etc. The addition of the glycerophosphates avoids a too depressing influence when long continued (p. 429). Bromids should not be given in exhaustion of a nervous or nutritive character.

Strychnin is important in the treatment of functional atony and relaxation, in mental or physical exhaustion due to excitement and overwork. Dosage must be increased.

℞. Zinci valerian.
Quin. valerian.
Ferri valerian.....āā gr. j
Ext. cannab. indic..... gr. ½
Ft. tal. pil. no. xxx.
S.—One p. c.

The glycerophosphates of lime and soda may be given in capsules with or without the addition of other drugs, or they may be given in five-grain tablets. Each tablet contains—

Calc. glycerophosph.....gr. iiss
Sodii glycerophosph.....gr. iiss
} Known as duotonol

Or—

Calc. glycerophosph.....gr. iiss
Sodii glycerophosph.....gr. iiss
Strychn. glycerophosph.....gr. $\frac{1}{60}$
} Known as triotonol

Or—

Calc. glycerophosph.....gr. iiss
Sodii glycerophosph.....gr. iiss
Quinin. glycerophosph.....gr. ¼
Strychn. glycerophosph.....gr. $\frac{1}{200}$
} Known as quartonol

Or—

Calc. glycerophosph.....gr. ij
Sodii glycerophosph.....gr. ij
Ferri glycerophosph.....gr. ½
Mang. glycerophosph.....gr. ¼
Quinin. glycerophosph.....gr. ¼
Strychn. glycerophosph.....gr. $\frac{1}{200}$
} Known as sextonol

℞. Quinine sulphate.....gr. xv
Arsenic trioxid.....gr. i-iss
Extract of cannabis indica.....gr. vij
Mix and divide into thirty pills.

℞. Iron lactate,
Aqueous extract of cinchona.....āā ℥j
Alcoholic extract of nux vomica.....gr. xv
Extract of gentian, q. s.
M.—Ft. pil. No. 100.

Overfeeding is often an essential procedure in many of these cases, especially in those who have lost in weight or who have limited themselves to a restricted diet because of real or imaginary inability to digest certain foods. The very best method of overfeeding these cases is to give them a diet which at the same time overcomes the constipation which is very often an associated annoyance and to which many patients attribute all their ills. (See section on Constipation.) Overfeeding is of value for the treatment of splanchnoptosis and the nervous, asthenic, and excitable conditions comprised under the terms nervousness, neurasthenia, and hysteria. Food can be taken in large amounts if given every hour or two in small portions. Absolute rest in bed is not always necessary; a certain amount of exercise is beneficial and promotes appetite. Milk, cream, cocoa, and chocolate should be given. Butter, eggs, and nutritious preparations in the form of thick cereal or cream soups are of value. Butter, the yolk of eggs, plasmon, somatose, sanatogen may be added to the soups. Puddings, toast, zwieback, omelets, cereals with butter and cream, are well digested. Peas, beans, and lentils permit of the addition of butter. Fruit jellies, honey, compots, and fruits have a good effect on constipation. In obstinate constipation the grosser forms of vegetables may be given. Of meats, the best are filet, veal, and fowl, which are to be prepared in pure butter. Fish may be added. Milk, however, forms an important part of the diet, but should not exceed two quarts a day.

In the severe forms of neurasthenia a rest cure is all-important. This method is of great aid in the after-treatment of operated patients, especially such as have been reduced to a very nervous condition by long-continued pain. The method followed by Dubois with slight modifications is excellent. He demands: (1) Several weeks (ten to twelve) spent in bed in quiet, away from home in a sanitorium. (2) Isolation, generally without visits or letters. Occasional visits, occasional epistolary relations, may be allowed if the patient is not too emotional, if trifles are not too annoying, if family affairs are pleasant. (3) Overfeeding. For

the first six days only milk is given, every two hours from 7 A. M. to 9 P. M. in divided amounts. Twenty-four ounces are given the first day, thirty-six the second, forty-eight the next day, fifty-seven the fourth day, sixty ounces the fifth day. On the sixth day sixty ounces are given and at breakfast time, *i. e.*, with the first dose of milk, bread, butter, sweets or honey are added. On the seventh day the diet changes to the following:

Breakfast.—Milk, 12 ounces, bread, butter, honey or preserves.

10 A. M.—Milk, 8 ounces (or matzoon).

Lunch.—Full meal, varied and copious (especially as to butter and vegetables).

4 P. M.—Milk, 8 ounces (or matzoon or buttermilk).

Supper.—Full meal, varied and copious, especially as to vegetables and stewed fruits.

9 P. M.—Milk, 8 ounces.

The dislike for milk usually disappears. By the addition of lime-water, sugar of milk, pepsin, etc., its digestibility and action on the bowels can be regulated. Constipation lasting three days is overcome by a high enema. Later on the amount of food taken overcomes this tendency. If it persists, a suppository of glycerin may be given at the same hour each morning after breakfast to accustom the patient to regular evacuations.

The patient should have the time and interest of the physician, for the influence of the physician is an important factor; to Dubois, almost the all-important factor. To him psychotherapy, the therapy of suggestion, plays an essential rôle. I heartily recommend the reading of his work on "The Psychic Treatment of Nervous Disorders," translated by Jelliffe. While perhaps extreme in the scope claimed for it, except in the hands of the experienced and gifted, it shows the marked value of psychotherapy, a therapy which many practice unconsciously or consciously, but a therapy of the very greatest value in the treatment of many of the associated nervous conditions in gynecology.

Professor J. R. Angell has said: "When we talk about therapeutic methods of treating diseases through the mind, it does not mean that we are not producing any change in the nervous system; it simply means that we are producing changes in the nervous system by initiating changes in what we call the mind; and, as a matter of fact, when we come to conclusions and see what we have done,

we have said something, done something, or brought something to pass which affects the sense organs of the person with whom we are dealing, and that process inevitably affects the brain. Mental processes have corresponding brain processes, and if we are not able to point them out at any particular time, it is in consequence of our ignorance and not because the facts are lacking to substantiate it.

"From the beginning of time physicians have made more or less use of psychotherapeutic methods, in that they have brought and are bringing to the sick room a hopeful personality, cheerfulness, and an attitude of encouragement to the patient. I have nothing but the deepest respect and the deepest confidence in the outcome of the use of psychotherapeutic methods by medical men. Our attitude toward the ministers or laymen who are working under medical control is essentially this: There is a large group of individuals who, to all intents and purposes, are mentally abnormal, who need help, and who, in the first place, are not likely to go to a physician to get that help, because their troubles are perhaps moral rather than physical. If they should consult a physician, they are not likely to get from the average physician what they really need, and I cannot but believe that ministers who are well trained for their duties have a wide range of usefulness in this particular direction, and I think it is problematic whether the medical practitioner can really fill the bill, and whether he will wish to try to, or whether he ought to try to."

Dr. S. Kuh has said: "The physician's method of dealing with his patient is of paramount importance. The neurotic individual is usually a keen observer. He watches with the greatest interest the examination of the physician, notes whether this or that organ has been overlooked, and whether the investigation is made in a careful and painstaking or in a slovenly manner. Next to the physician's personality, I should value the influence of the first examination most highly. It must indicate to the patient that his physician takes a genuine interest in the case. The best results in psychotherapy are undoubtedly obtained when the patient is transplanted into new surroundings; for most of the serious and tedious cases such a step is absolutely necessary. Even the nurse, as a rule, should not accompany the patient from his home to the sanitarium. Here begins a process of re-education, which in every instance must be adapted to the individual, and for which no hard

and fast rules can be laid down. An intelligent nurse, one who supports the phyician understandingly in his efforts, who strengthens the patient's confidence, who diverts his mind from his troubles, and pains, and aches into more pleasant channels, is a *sine qua non* of success. For patients who are anemic, emaciated, poorly nourished, and for those who suffer from anorexia, hypochondriasis, and the various phobias, a rest cure is often the best thing. Others may do better if sent to the country or to the mountains, where they receive new impressions and where an occupation may be found which keeps them busy, without making great demands in the way of intellectual labor. Again, others will progress most rapidly toward recovery in an institution adapted for the so-called work cure, a place where carefully regulated manual labor is prescribed according to the needs of the case. The therapeutic agent under discussion is most useful in such functional neuroses as hysteria, neurasthenia, and psychasthenia. But its usefulness is not limited to such troubles. All of us make use of psychotherapy constantly, often utterly unconsciously, as a palliative in all manner of organic disease. To instil hope into the breast of the despairing, to arouse the individual who has given up the struggle to fight anew, are things that are well worth doing, even in organic and incurable diseases. That we have not recognized the importance of psychotherapy has driven a host of sufferers into the hands of laymen, who were willing and more or less capable to make use of a method, perfectly legitimate in itself, but on which the medical profession frowned. In place of abusing those who are ready to do what we ourselves should have done long ago, let us make use of the powerful weapon at our command, and the cause for complaint will disappear."

Climacterium.—A symptom of climacterium is the disturbance of vasomotor function characterized by flashes, dizziness, restlessness, etc. These may be treated by baths of 90° to 100° lasting fifteen minutes, which diminish the blood-pressure and are recommended by Gottschalk. For abdominal plethora and obesity, the use of Glauber's salts, general massage, and exercise are important. If the nervous symptoms are most prominent and are of a sexual character, cool body douches are advisable. For sexual excitement the bromids, heroin, and hyoscin are helpful. Ovarin (gr. v, t. i. d.) combined with sextonol (gr. v, t. i. d.) should be

given in all cases. Strychnin, glonoin, and digalen may be necessary. In the treatment of those conditions of a nervous nature complicated by profuse bleedings, the use of ergotin, stypticin, and hydrastinin is essential. The carbonated saline baths are more or less contraindicated when profuse bleedings are a symptom, and under like circumstances the administration of ovarin should not be practised too regularly. When the nervous conditions of the climacteric age are accompanied by a gradual diminution of menstruation, many of the patients are benefited by ovarin (gr. v, t. i. d.) and carbonated saline baths.

It is in many of these excitable nervous cases that the use of bromid and glycerophosphates gives us very good results. I am in the habit of administering 5 grains of sodium glycerophosphate and 10 grains of strontium bromid in one dram of water, or elixir of pepsin, three to four or more times a day. This combination is of the greatest value in the excitable forms of nervousness discussed in this section.

℞. Strontii bromidi..... ℥iv
Aq. menth. pip..... ℥iij
S.— ℥j every four hours in water.

℞. Strontii bromidi..... ℥iv
Sodii glycerophosph..... ℥ij
Elixir pepsini..... ℥iij
M. S.— ℥j t. i. d. p. c. and at night in water.

In the treatment of cases of hyperthyroidism, or of aberrant Basedow's disease associated with tachycardia, ovarin, 5 grains, should be administered with whatever form of treatment is used. Local treatment, ovarin, and the use of mild carbonated baths often aid in putting cases of hyperthyroidism in good condition. Rest should be advised. Meat and sea-food should be forbidden. A vegetarian diet is advisable. Sodium phosphate, ℥j in hot water a half hour before breakfast, should be ordered. Intestinal fermentation is to be prevented by a pill of blue mass (gr. v) once a week and by sodium benzoate (gr. x) in capsules one hour after each meal, this being the method W. H. Thomson follows in the treatment of Basedow's disease. In all cases in which both ovaries have been removed the routine administration of ovarin, 5 grains three times a day, should be practised shortly after the operation.

Owing to the value of the carbonated saline baths, especially in depressed nervous conditions as well as in local states, the section on Nauheim Baths deals with the indications for their use and with the mode of application.

CONSTIPATION*

During digestion peristaltic contractions of the smooth musculature of the intestinal wall take place which propel the contents from the pylorus toward the anus and mix them with the digestive juices. The nerves of the intestinal mucosa are excited by the normal chyme. This excitation is transmitted to the muscularis through the plexuses of Meissner and Auerbach, automatic nerve-centers situated in the submucous and muscular coats respectively. But peristalsis, normal as well as pathologic, is also under the influence of the cerebrospinal system; irritation of the vagi stimulates, irritation of the splanchnics inhibits it. The anal orifice is closed through the tonus of the sphincter muscles, aided by the levator ani. The fecal column in its descent through the rectum produces a reflex contraction of the sphincters or a short augmentation of their tonus which we interpret as the desire to go to stool (nervi hypogastrici and erigentes; lumbar enlargement of the cord). Then a relaxation of the external sphincter takes place through voluntary cerebral inhibition, rectal peristalsis continues, the abdominal press is set in motion, the levator ani contracts and lifts the anus over the advancing column.

The chyme passes through the small intestine (20 feet) in two to six hours, through the colon (5 feet) in twenty to twenty-four hours. The remains are stored in the sigmoid and upper rectum.

The feces are derived from three sources: (*a*) Food residue; (*b*) intestinal contributions; (*c*) bacteria. The food residue consists of the indigestible parts of the ingesta and of the digestible portions which for some reason have escaped digestion and assimilation. The intestinal contributions are the digestive juices

* This section has been written by Dr. George B. Mannheimer. His methods of treating constipation have been long adopted by me. The hygienic, dietetic, and mechanical procedures used in the treatment of constipation are of very great value in improving the general physical tone, and include many of the methods which I have found of greatest aid in the treatment of asthenia and many nervous conditions in women.

which have not been reabsorbed, intestinal mucus, and desquamated epithelia. The amount of bacteria varies considerably.

Starvation-feces are made up largely of bacteria, intestinal mucus, and desquamated epithelia.

The normal quantity of feces passed by a healthy adult living on a mixed diet ranges from 130 to 250 gm. (4 to 8 ounces approximately), of which 35 to 70 gm. are dry residue and 75 per cent. water. It is much larger on a vegetable than on an animal diet.

The term constipation cannot be accurately defined. Generally speaking, it means an infrequent or insufficient evacuation of the bowels.

Most healthy adults have one movement a day, some have two or three, and others one in two or three days. These variations in frequency and quantity become pathologic when they produce subjective or objective disturbances, be they ever so slight, in the intestinal tract, in remote organs, or in the general condition.

In this chapter we wish to discuss only the so-called habitual constipation of adults. We are not concerned with constipation in infants and children, with acute constipation in febrile diseases or after operations and injuries necessitating rest in bed, with those forms of symptomatic constipation which are due to organic diseases of the digestive tract, to pelvic diseases, to cardiac, pulmonary, or renal trouble, to mental or other disturbances of the central nervous system, to systemic diseases, such as anemia, diabetes, etc., or to intoxications, such as lead poisoning.

By habitual constipation we understand a condition which is based on the habits of the individual, a condition for which we find no tangible anatomic cause, and which therefore forms an apparently primary and independent trouble. We ascribe it *to atony, i. e., lack of tone*, of the intestinal musculature, a *functional weakness* which renders the expelling forces unable to accomplish the work which they are expected to perform. Or we explain it by an *abnormal innervation* of the intestinal peristalsis, especially of the colon and rectum. Though we do not know the actual mechanism of this disturbance of nerve function, we must assume that muscular and neural disturbances are commonly associated, the former being the natural effect of the latter.

Habitual constipation is much more common in women. Their

more sedentary life, their liability to pregnancy and the puerperal state with its atonic, asthenic sequelæ, their tendency to peculiar local pelvic troubles which may interfere with or inhibit intestinal peristalsis, all lead to a constipation which is merely symptomatic in the beginning, but which is readily perpetuated into a habit, even after the original pelvic troubles are corrected.

ETIOLOGY

There may be a congenital weakness of intestinal peristalsis which manifests itself from birth and persists throughout life. It may run in families. But the commonest causes are acquired:

1. Bad habits and unhygienic living. (*a*) Neglect to attend to the calls of nature. The normal desire for defecation is suppressed through laziness, mental preoccupation, ignorance, prudishness, or lack of time and proper facilities. With the poor, lack of decent and comfortable accommodations is a factor of no small importance. (*b*) Reading while at stool, thus diverting the attention from an act which requires full concentration. (*c*) All irregular habits of life, as irregular meals, sleeping hours, frequent trips. (*d*) Sedentary occupations and lack of exercise; factors, however, which are somewhat overestimated.

2. Improper food. This usually refers to food which leaves too little residue and consequently produces in the colon a too slight peristaltic and secretory stimulus. Such is the food of many persons of the wealthy class, who consume highly nutritious and easily assimilated food-stuffs, principally nitrogenous. Others, especially dyspeptics, restrict their diet to what they consider easily digestible. The physician may be responsible for the evolution of constipation by prescribing a too one-sided diet. This cannot be avoided with diabetics, where we have to choose the lesser evil. Generally speaking, all exclusive dietary schemes, such as a milk diet, etc., act in the manner mentioned above. Even a strictly vegetable diet, which in the beginning powerfully excites peristalsis and secretion, producing copious passages, may also in the course of time overtax those functions and finally lead to atony. Some women exclude from their diet all fats and oils either because of dislike or because of the fear of obesity or of an injurious effect on

the complexion. Poor teeth may prevent people eating what they ought, or produce dyspepsia and constipation through improper mastication. Many individuals abstain from water because they do not care for it or because they prefer to take it in the form of stimulating drinks, or because they fear that it conduces to obesity. This latter belief is absolutely unfounded. No amount of water taken during or between meals in itself will lead to obesity, unless the person develops a better appetite on drinking at meals. On the contrary, it is one of the tricks of some obesity cures to let patients drink as much water as possible before meals to fill the stomach and so reduce its capacity for solid food. Too little water is deleterious to normal intestinal peristalsis and secretion, as is shown by the fact that patients with pyloric stenosis are almost always constipated, because water is not absorbed from the stomach but only from the intestines. Diabetics are often constipated because they excrete so much water through the kidneys. People who undertake severe physical or prolonged work which provokes profuse perspiration are apt to become constipated. It is not to be assumed that the water ingested simply dilutes the feces. We all know from experience that it may excite peristalsis when taken very cold (cramps), but its main action after its absorption into the blood, the plasma of which contains 90 per cent. of water, consists in furnishing the principal material for most secretions, including the digestive juices. It must be mentioned that constipating substances are often ingested with food and drink, wittingly or unwittingly; for instance, large quantities of lime in some drinking-waters, alum in adulterated flours and baking-powders, salts of lead in cheap candies, salts of copper in pickles and condiments, and, last but not least, iron given or taken for medicinal purposes during a too prolonged period.

3. An abnormally vigorous digestion (Schmidt and Strasburger). Some persons digest substances which are usually not attacked by the digestive juices and they assimilate more of their food than is done by the average channels of assimilation. They, too, have too little residue left in their bowels; they have fewer intestinal bacteria, less fermentation and putrefaction, and as an ultimate result too scanty and too infrequent movements.

4. The abuse of aperients, a wide-spread evil. Physicians,

druggists, and laymen are responsible for it, and women especially have acquired the habit of self-dosing. In general, purgatives and laxatives are used too readily and indiscriminately for all sorts of conditions and complaints. Their use is persevered in too long or repeated too often in spite of the obvious fact that after a thorough cleansing there is nothing left for the bowels to work upon, and that a period of apparent constipation is necessary for the re-establishment of natural action.

Hospital and dispensary physicians are great offenders in this respect. In many hospitals it is the routine to administer a purge to almost all patients on admission and to continue some form of laxative or enema throughout the whole stay, even with patients who had no intestinal difficulty before. This entire matter is left to the discretion of the house-staff, men fresh from college, who are not familiar with the strict indications for the administration of aperients (although they know the difference between castor oil and croton oil, between a hydragog and a cholagog), and who do not realize that the patient's intestinal functions may be permanently damaged thereby.

In dispensaries this practice is as bad or worse, not only in the medical divisions, where most cases of symptomatic and idiopathic constipation are treated, but also in the neurologic, gynecologic, and dermatologic departments. So many nerve and skin affections are ascribed to autointoxication resulting from constipation, so many pelvic affections in women are ascribed to or supposed to be aggravated by constipation, that it is small wonder that physicians prescribe aperients galore. We believe that the autointoxication theory is carried entirely too far. In the medical division constipation cases excite no particular interest. They are usually dismissed with a prescription calling for salts or cascara, etc., and perhaps with offhand dietetic directions. Rarely does the physician go into the etiology. Rarely are full and proper dietetic directions given. Seldom are physico-therapeutic measures prescribed or administered. The physician excuses himself on the ground that he has nothing else at his command, and that dispensary patients are not satisfied unless they get a prescription.

While speaking of drug-abuse, I wish to mention that the use of narcotics is often a self-evident cause of constipation.

5. Weakness of the abdominal and perineal muscles, for which pregnancy and parturition are common causes. I wish to emphasize the fact that the so-called abdominal press (abdominal muscles and diaphragm) has nothing to do with peristalsis proper, and that this aid comes into play only with the act of expulsion of the feces from the lower rectum, as is likewise the case with the levator ani.

6. Mental and nervous influences. Just as a sudden fright is known to produce diarrhea, so worry, grief, and other depressing emotions may inhibit peristalsis. Prolonged mental effort acts similarly. Hysteria and neurasthenia, so called, are frequently accompanied by constipation. The disturbed nervous equilibrium which affects almost all the body functions also upsets normal peristalsis and secretion.

7. All factors which debilitate the entire system. In chronic diseases with progressive emaciation and debility the intestinal functions may naturally become weakened.

Frequently several of the aforementioned causes are at work simultaneously.

Habitual constipation is common in old and in obese people. With advancing years the muscular and glandular structures and functions deteriorate; food is selected more carefully and active exercise is not indulged in.

In obesity great masses of fat in the parietes, in the omentum and mesentery may act as a mechanical impediment to peristalsis and the intra-abdominal circulation. To these is added the well-known repugnance of stout people to active exercise.

PATHOLOGY AND PATHOGENESIS

Adhering strictly to our original definition, there can be no pathology of habitual constipation. No one succumbs to this malady except those rare cases of idiopathic dilatation of the colon where obstinate constipation begins at birth, persists into adult life, with ballooning of the abdomen, and where enormous dilatation of the colon and sigmoid is found to be associated with hypertrophy of the muscularis and secondary ulceration of the mucosa (Hirschsprung's disease). There have been many autopsies on

cases with antecedent history of habitual constipation, but who have died from other diseases or from injuries. In a very few of them degenerative changes were discovered in the splanchnics, the motor nerves of the longitudinal fibers. In a few others the only anomaly found was a muscularis of the colon below the average thickness (0.12 to 0.25 mm. as against 0.5 to 1 mm.). This condition, which is doubtless responsible for defective peristalsis, is probably a congenital hypoplasia and cannot be recognized during life. It must be emphasized that these are not cases of general emaciation or cachexia where a priori muscular defects might be expected.

However, three anatomic lesions have often been and are still mentioned as the underlying causes of habitual constipation: (1) Atrophy of the muscularis; (2) peritoneal adhesions; (3) displacements of the colon.

Atrophy of the muscularis occurs with or without atrophy of the mucosa, and is the outcome of intestinal catarrh, but not the invariable result. Hence it plays no rôle as a causative factor of primary habitual constipation. It can rarely be recognized during life.

Peritoneal adhesions are found generally in the ileocecal region and at the hepatic, splenic, and sigmoid flexures. These are not the cause but the effect of chronic coprostasis, through the medium of stercoral ulcers or of diverticula. Adhesions remaining after attacks of appendicitis, after gastric or duodenal ulcers, after laparotomies, may, but rarely do, cause constipation.

Displacement of the colon, especially of the transverse part, is often a sequence of its habitual overloading with stagnant fecal masses. The colon is simply dragged down by mechanical weight.

Congenitally abnormal length of the sigmoid is a common cause of constipation, when this condition is not outgrown. Congenitally abnormal length or shortness of the mesentery may be responsible for displacement of the intestines, but usually these displacements are a part of a general splanchnoptosis.

The habitus enteroptoticus which is congenital differs from the normal state in the following characteristics: Long, narrow, flat thorax; acute costal angle; floating tenth ribs; the epigastric and both hypochondriac regions are longer than wide; the viscera find better accommodation in the vertical than in the horizontal direction.

If such persons lose flesh, especially parietal and omental fat, or if their abdominal walls become flabby and the recti gape, as after confinement, or if they lace tightly, the stomach, colon, and kidneys sink down and constipation often follows. Individuals endowed with the enteroptotic habitus are specially prone to functional gastro-intestinal disturbances; or, in other words, their digestive functions are upset by influences which do not affect a normal constitution. This habitus has therefore also been called asthenia universalis congenita (Stiller). This asthenia concerns preeminently the gastro-intestinal musculature (atony), but also the nervous system, and manifests itself in a variety of neurasthenic or hysterical symptoms. Thus the common combination of enteroptosis, atony (dyspepsia and constipation), and nervousness will be understood.

SYMPTOMATOLOGY

Habitual constipation is compatible with the enjoyment of full health. How long this can continue is difficult to determine. Such individuals either have a very good nervous system or they disregard slight symptoms or become habituated to them, or else they belong to that class endowed with an abnormally vigorous digestion mentioned in the section on Etiology.

Usually there are symptoms, either local or remote or general. The first are abdominal discomfort, fullness, tension, bloating, borborygmi, flatulence, bad taste, fetor; smooth, round or cylindrical masses palpable in the sigmoid; dry, dark, hard scybala. Slight pain is not unusual. Attacks of colic deserve special consideration. They sometimes dominate the clinical picture to such a degree that these cases have been specially designated spastic constipation. Here the retention of the intestinal contents is not due to atony, but to spasm of the musculature. The stools are of small caliber, of pencil or small finger shape, or small round balls like sheep-dung. These individuals are markedly neuropathic, and are usually women suffering also from pelvic troubles. During a large part of their lives they have accustomed their bowels to cathartics. They may have acquired a simple or membranous enteritis.

Boas mentions a third variety of habitual constipation which we

have also observed a number of times. The evacuations are fragmentary, *i. e.*, insufficient, leaving behind a sensation of abdominal and rectal discomfort which compels the patient to go to stool repeatedly and pass small quantities of cylindric or spherical hard or pulpy masses. This variety occurs more frequently in men and seems to depend on a sluggishness of the sigmoid and rectum.

With considerable coprostasis there may be very severe attacks of colicky pain with tympanites, fainting, even collapse and vomiting, reminding one of ileus. Backache is common.

Of the remote organs the stomach is first affected by habitual constipation. There may be eructations, bloating, fullness, nausea, anorexia, pain up to severe gastralgia. Gastric ulcer may be simulated.

The heart may also show symptoms, such as palpitation, disturbed rhythm, precordial oppression, up to pseudo-anginal attacks.

The upward pressure of the diaphragm by accumulation of gases and feces may cause shortness of breath.

Nervous symptoms are common, viz., pressure, heaviness or a feeling of heat in the head, lassitude, and dizziness; often headache, inability to do mental work, depression of spirits up to a well-developed picture of hypochondriasis. Insomnia is frequent. Facial neuralgia and hemicrania may also occur.

Rectal accumulations may alter the position of the uterus and by direct pressure may give rise to sciatic, lumbo-abdominal, or pseudo-ovarian neuralgia. They may likewise produce dysuria.

Albuminuria and cylindruria are by no means rare in chronic constipation.

Anemia and chlorosis are by some supposed to be the consequence of chronic constipation (copremia—Andrew Clark). The strict proof of this causal connection is lacking.

Stercoral fever is more often seen in infants and children than in adults. If women in the puerperal state or after gynecologic operations develop fever which is relieved by purgation, coprostasis *per se* is not the responsible factor. Pressure is possibly exerted on small pelvic inflammatory foci, which are thus more readily absorbed, with the consequent production of temperature (Küstner).

The pathogenesis of these various symptoms is to be explained

in different ways. (*a*) Reflexes mechanically produced; (*b*) symptoms of a neuropathic disposition provoked by the intestinal trouble; (*c*) intestinal auto-intoxication.

These three hypotheses do not exclude each other. The first two are easily understood. A few words as to the last. From an extensive study of the literature the following conclusions can be derived. It cannot be proved by our present methods that simple constipation increases decomposition in the intestines. There is much less absorption from inspissated stagnating masses, such as form the contents of the colon in ordinary atonic constipation, than from stagnating fluid masses such as we find in defective peristalsis of the ileum and jejunum.

Increase or decrease of intestinal decomposition need not be the consequence of motor disturbances, but may be the cause thereof. The normal products of fermentation and putrefaction, especially gases and volatile fatty acids, stimulate peristalsis of the large bowel. If because of improper food or of an uncommonly good digestion the food residue be small, the number of intestinal bacteria is apt to decrease as well as the amount of decomposition products. Lastly, the quantity of aromatic bodies in the urine (indicanuria) is no accurate indicator of the amount of bacterial activity in the intestine, nor of decomposition and absorption of bacterial products.

Habitual constipation rarely exists for any length of time without the development of one or more of the following sequelæ: Hemorrhoids, anal fissure, catarrhal inflammation of the whole or part of the colon or rectum, ulceration (stercoral ulcers), dilatation, coproliths, displacements, diverticula, and hernia (from habitual straining). The more serious sequelæ are appendicitis (from fecal concretions), peritonitis (from ulcers or diverticula), and intestinal obstruction.

DIAGNOSIS

A diagnosis of constipation is generally easy. Patients usually tell us they are constipated and have to use artificial help to procure passages either regularly or frequently (complete constipation), or only at intervals (incomplete constipation). But then it is incumbent on us to determine whether we are dealing with a pri-

mary idiopathic habitual constipation or with a symptomatic one; *i. e.*, we must exclude all conditions, local, remote, or general, which may give rise to constipation. This requires a thorough examination of the entire body. We should never omit to make a rectal and vaginal examination. How else can we recognize rectal cancer, so commonly accompanied by coprostasis; or those much disputed rectal folds (Houston's valves) which when hypertrophied offer a mechanical impediment to the descent of the feces; or fecal accumulations in a wide ampulla which are, for instance, always found in fragmentary constipation even immediately after an evacuation; or the empty contracted rectum in spastic constipation; or uterine displacements and pelvic exudates? A careful palpation of the abdomen will give the most valuable information. Aside from neoplasms, and other structural lesions which may have to be excluded, it will reveal that most characteristic objective sign of chronic constipation, fecal tumors. They are of doughy consistence, of bead-like arrangement, moldable by pressure, movable, and affected by purgatives or enemata. But sometimes these characteristic symptoms are absent, and then the differential diagnosis between fecal and other abdominal tumors becomes extremely difficult. We cannot enter into differential diagnostic details. We only wish to mention here one diagnostic method which is neglected too much—probatory lavage of the colon. This is done as follows: The bowels are emptied by a purgative or by enema. Then through a rectal tube connnected by cannula with a rubber tube and glass funnel ½ to 1 liter of warm water is allowed to run in and out of the colon by alternately raising and lowering the funnel; fresh water is always introduced until the return is clear. The washings are allowed to settle and examined macroscopically and microscopically. We look especially for mucus in large or small shreds, pus, blood, and tissue particles. Their diagnostic value is evident.

Colitis, one of the most common causes and sequelæ of chronic constipation, can only thus be recognized. In this condition the colon proves to be tender on palpation, but so it is also in simple spastic constipation, where we often feel the sigmoid, descending or ascending colon as tender, firmly contracted cords which change form under our fingers.

Temporary or prolonged diarrhea or the patient's assurance of one daily movement should not mislead us. Irritation of the mucosa by hard scybala may bring on hyperemia, serous secretion, liquefaction of the intestinal contents, and abnormal gas production, which all accelerate peristalsis (stercoral diarrhea). Or the feces accumulate and become inspissated in the pouches of the colon and a central canal remains patent through which a daily evacuation takes place. A thin varnish-like coating of mucus over hard scybala does not mean catarrh, but is simply a local irritative hypersecretion.

Among gastric diseases ulcer, pyloric stenosis, hyperchlorhydria, and atony are most frequently associated with constipation, especially atony. Hence the necessity of examining the motility and chemistry of the stomach. The coexistence of gastric and intestinal atony is due to the same underlying causes. Hyperchlorhydria is frequently accompanied by constipation; the actual mechanism is not understood. We know from Strasburger's ingenious method of weighing intestinal bacteria (living and dead) that they are diminished in hyperchlorhydria. The latter may be a sequel of habitual constipation, probably induced by the habitual abuse of cathartics.

Enteroptosis is easily recognized by the habitus enteroptoticus described above, by bimanual palpation of prolapsed kidneys (nephroptosis), by the detection of a stomach-splash in an abnormal location, and by gastric transillumination (gastroptosis), by insufflation of the colon with air or gas, or filling it with water for the purpose of detecting a prolapse of the transverse colon (coloptosis).

The differentiation of atonic and spastic constipation is easy from the symptoms. Often enough the two conditions coexist, or spastic phenomena manifest themselves in the course of ordinary atonic constipation: attacks of colic in which the usual cathartics do not act at all or only in enormous doses and with great pain; cord-like contraction of the colon, which is tender; rectum empty; the stools as described above. Paul Cohnheim claims that almost every case of habitual constipation goes through the following stages; (*a*) atonic; (*b*) catarrhal; (*c*) spastic stage; (*d*) enteritis membranacea; (*e*) colica mucosa; (*f*) mucous diarrhea. This classification is somewhat schematic, but instructive and practical.

A diagnosis of habitual constipation is not complete without a diagnosis of the etiology. A painstaking anamnesis and examination of the whole body will bring out the etiologic factors in most cases.

Let us recapitulate the most important diagnostic hints:

Do not overlook rectal and intestinal carcinoma.

Learn to recognize fecal tumors.

Remember the occurrence of stercoral diarrhea.

Recognize the coexistence of constipation and intestinal catarrh; weigh their interaction in each case.

Remember Trousseau's dictum that about one-half of the gastralgias originate in the transverse colon.

PROGNOSIS

The prognosis as to life is good. No one ever dies of constipation directly, but the sequelæ (intestinal obstruction and peritonitis) may prove fatal. It is worthy of note that the three surgical diseases most commonly calling for major operations, appendicitis, hernia, and hemorrhoids, are intestinal, and chronic constipation is frequently responsible for their development. Thus it is to be seen that habitual constipation is not a negligible factor.

As to cure, the prognosis is doubtful. A permanent cure is feasible in some cases; *i. e.*, natural action can be established and maintained where hitherto artificial means were constantly to be resorted to. But too often the disturbance recurs. Presupposing an intelligent conduct of the case, success is dependent largely on the patient's means and her personal character. Failures and relapses are frequently the result of a want of perseverance. Too often the condition is neglected and only comes under systematic treatment after the drug-habit or enema-habit has become firmly established or after organic changes have taken place. Prognosis is affected by the duration of the trouble and the age of the patient. Most essential of all is intelligent and willing co-operation of physician and patient.

PROPHYLAXIS

Prophylaxis ought to begin in the first year of life. The foundation for many a weak digestion is laid during that period. In-

telligent nurses know how to coax infants into having their daily movements at regular hours. Children ought to be supervised as to that function. Boys and girls, especially of school age, must be impressed with the importance of the act and its regularity. They must be cautioned not to neglect the calls of nature. Girls ought not to wear corsets too early. With them the habitual use of purgatives is especially disastrous and reprehensible. They should be brought up on a mixed diet and taught to drink water freely. These measures, the cultivation of regular habits, a common-sense mode of life, a common-sense dress, and avoidance of tight lacing are the best preventives of habitual constipation at all times. These measures must be insisted upon, especially in members of families where sluggish bowels are a family failing.

The pregnant state, which offers a special predisposition for the development of constipation, must be managed with a view to the prevention of this disorder. Much can be done by proper diet, outdoor life, and abdominal binders. Intelligent management of the puerperal state, as outlined in another section, will preserve the intestinal functions or restore them should they become disordered.

We heartily wish to recommend here the following simple gymnastic exercises, which ought to be commenced one week after delivery, provided the course of the puerperium has been perfectly normal. Patients lie flat on their backs and raise themselves to the sitting position without the aid of their arms and hands, and then gradually and slowly return to the recumbent position; the latter exercise must be done in stages during which the trunk is held through muscular action in various angles to the pelvis. It may be necessary to start with the latter exercise, in case patients are too weak to do the former first. The exercises are gradually increased up to ten to twenty times, two to three times a day. They can also be done against resistance. The change in the structure of the abdominal wall under these exercises is truly astonishing; from day to day we can feel the muscle bundles become broader and firmer and the interstices between them smaller. If this procedure is continued sufficiently long, the abdominal muscles may develop to such an extent that the wearing of a post-partum binder can be dispensed with.

Gynecologists ought to pay more attention to constipation. They see a great deal of it. Pelvic inflammatory disorders by inhibiting peristalsis may be responsible for constipation. Frequently enough constipation causes pelvic congestion. Physicians ought not to be satisfied with a prescription for a cathartic, but should treat their cases as outlined under the next heading, and they should not dismiss a gynecologic case from treatment before they have done their best to cure the existing constipation.

The family physician must be, as in so many instances, the principal prophylactic agent. He must on all occasions warn his patients against the abuse of cathartics; he must combat the fallacious opinion that all sorts of minor ailments can be driven out by a good purge, or that the treatment of every acute disease must begin with a dose of salts.

Hospital and dispensary physicians ought to awaken to their therapeutic sins in this respect and to their responsibility in fostering the most common of disorders of civilized man, constipation, by the indiscriminate and injudicious administration of purgatives.

In dispensaries special therapeutic departments ought to be created where hydrotherapy, mechanotherapy, and electrotherapy are practised and where cases of habitual constipation are sent for special treatment, after their diet has been mapped out and faulty habits have been corrected by the attending physician, the latter to control the entire treatment. The creation of physico-therapeutic departments, while materially enhancing the value of dispensary treatment for all applicants, would especially benefit the large class of constipated patients.

TREATMENT

Drugs play a minor rôle. This must be the leading sentence. It is high time that physicians became imbued with the truth of this statement. The treatment consists of hygienic, dietetic, and mechanical methods, and where they can be ascertained, demands the removal of etiologic factors. Each case is a law unto itself. The following points apply to the average case of simple atonic constipation.

1. **Habit.**—Patients should be told to keep regular hours, so

far as possible, for rest, meals, and sleep, and above all, to go to stool at a certain fixed time every day. Normally, intestinal innervation is so constituted that the mechanism of defecation is set in motion once a day at about the same time. Hence the institution of a stool-time is but natural. This idea is so simple that it is not sufficiently appreciated by physicians and patients. Every day at exactly the same time the patient should go to the toilet and try to have a movement. If the effort is ineffectual after a reasonable time, she should wait until the next day, even if she feels the desire during the day. If these efforts be futile on the second day, she should take at once an injection of lukewarm water. The same practice is repeated on the following days, only the water for the injection is taken at a colder temperature. This systematic repetition of the act, exactly at the same hour, usually brings on the desire at that particular time, and it is rare that this training fails of its purpose (Trousseau).

The best time is after breakfast, because the ingestion of food into the fasting stomach incites intestinal peristalsis. For some people it may be more convenient to go to stool directly upon rising, after drinking a glass of water. Others may select, for reasons of expediency, any other time of the day. Patients with hemorrhoids do best to have their hour for defecation in the evening, when they have time to lie down afterward and permit the prolapsed and engorged nodules to recede and become degorged.

2. **Diet.**—The natural treatment of all digestive disorders is dietetic. No case of habitual constipation can be corrected without a proper diet, but some by that alone.

(*a*) Avoid all substances which tend to constipate, such as tea, cocoa, chocolate, claret, blackberries and blackberry cordials, whortleberries (all on account of their tannic acid content), potatoes in quantity, rice, thick gruels (except oatmeal), burnt flour, and certain kinds of cheese which form a tough curd in the intestinal canal. (*b*) Select such substances as stimulate peristalsis either mechanically by the bulky residue which they leave behind or chemically or thermically. As a rule, a combined action is produced, such as by cabbage, salads, or other fresh vegetables, beets, carrots, asparagus, turnips, pickles, celery, radishes, olives, onions, sprouts, spinach, tomatoes, bran-bread, Graham-bread, Pumper-

nickel. The active chemical agents are either present as constituents of these foods or are added to them before consumption, or are evolved during their digestion in the alimentary canal. They are organic acids (lactic, butyric, acetic, carbonic, tartaric, and malic, or the lower fatty acids), sugar, and common salt. These physiologic alimentary cathartics are represented by the following articles:

Fruits, best given cooked or stewed and sweetened with sugar of milk, especially apples, prunes, figs, oranges, peaches, dates, grapes, grape-fruit, melons, jams, marmalades, treacle, honey, syrup, lemonade, cider, light white wine.

Milk, which constipates a few people but purges many, especially when taken raw and with the addition of salt to prevent the formation of a tough curd; buttermilk; kumyss; matzoon; sour milk, prepared by spontaneous souring or by means of zoolak or of specially prepared lactic acid bacilli in the form of tablets; whey, prepared with rennet or cream of tartar.

Carbonated waters, beer, and champagne.

Salted foods, such as herring, sardellen, caviar, ham, smoked salted beef; condiments.

Fats and oils act as lubricants, if they escape digestion, but principally by being split up into glycerin and fatty acids, some of which are volatile.

Cold drinks act by their thermic effect, the cold being a strong stimulant to peristalsis. Cold water acts best on an empty stomach or at bedtime.

All substances from which we expect a chemical effect act better when not given on a full stomach and when interchangeably given from day to day.

From this large variety of anti-constipation foods and drinks we choose and combine those which seem best adapted to each specific case. Our choice must be governed by the circumstances of the patient, his tastes, his idiosyncrasies, his nutrition, the severity and duration of the trouble, the state of the digestive organs (hyperchlorhydria, atony of the stomach, tendency to flatulence), and by complicating diseases. Milk preparations and sweets are apt to give rise to flatulency. This wears off in time, or the patients get accustomed to it. But should it be excessive

and troublesome, then we have to substitute the offending substances by others on the foregoing list. Altogether, the proper diet is a mixed one with a restriction of animal food and a preponderance of carbohydrates and fats. Kohnstamm believes that meat contains constituents which inhibit peristalsis, and for that reason he eliminates meat entirely from the diet of constipated patients.

The grape-cure is used in certain European health-resorts with good effect for the relief of habitual constipation. Patients eat one pound of grapes (without the skins) the first thing in the morning, one pound before luncheon, and one pound before retiring —in addition to their regular meals.

The lemon-cure acts similarly and is more feasible. Patients take the juice of two to three lemons in a glassful of sugar-water three times a day. The cure is suitable for the gouty and obese.

The following is a diet list for a moderately severe case of atonic constipation:

Glass of cold water with a pinch of salt sipped the first thing in the morning on an empty stomach. One-half hour later:

Breakfast: Coffee with sugar and milk or cream; ham or bacon and a cereal breakfast-food; rye or Graham bread with plenty of butter and honey or jam or marmalade.

Luncheon: Eggs or meat, vegetables, bread and butter; a glass of buttermilk or a dish of sour milk.

Supper: Broth, meat, plenty of vegetables and relishes, compot (prunes and figs mixed), bread and butter; two hours later a glass of beer or ale. The beer may be taken with the supper and the compot before retiring. Water is to be taken freely between meals.

Individuality plays a great rôle in the matter of diet. The intestines of different individuals are amenable to different alimentary stimuli, and these must be ascertained in each case, which may at times require patient study and skilful experimenting.

3. **Kinesiotherapy (Exercise Treatment).**—It is an old popular belief that people of sedentary habits are particularly subject to constipation and to stasis of the abdominal and pelvic vessels. Exercise in the open air increases the activity of the circulatory and respiratory organs, promoting appetite and sleep and thus improving neuro-muscular and glandular functions. It has been

shown that by walking after meals the stomach empties itself more quickly. All outdoor sports, if not exaggerated, are of benefit to the constipated; some more, some less. Rowing is best; horseback-riding, swimming, bicycling, and bowling come next. Indoor gymnastics may be substituted or added (Zander apparatus, rowing machines). The German system of "Turning" is excellent.

The following exercises are adapted for home use: Raising the body from the horizontal position on the floor to the sitting and slowly returning (Fig. 116); bending the trunk forward and backward with knees stiff (Fig. 117); bending sideways (Fig. 118); rotating the trunk on the pelvis (Fig. 119); flexing the thigh

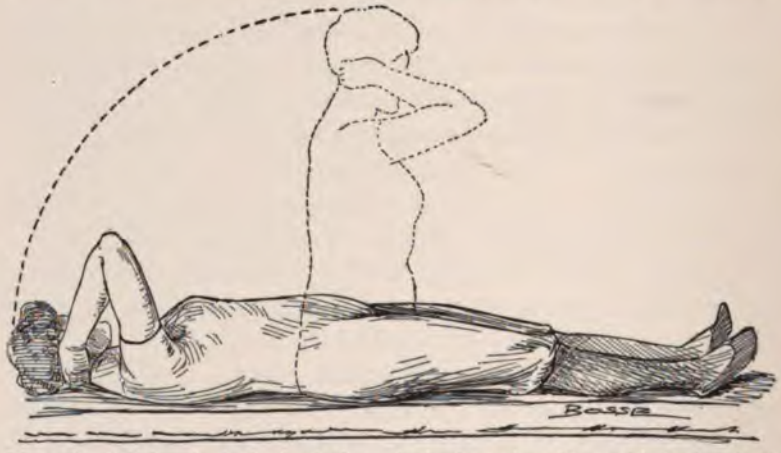

Fig. 116.—Raising the body slowly from the horizontal position, with the legs held straight and horizontal.

quickly and sharply against the abdomen (Fig. 121); settling down (Fig. 122). Between these various acts breathing exercises are in place. The important point about these exercises is that they should be executed accurately, systematically, and steadily. They are done twice a day, upon rising and before retiring, from ten to twenty minutes. The physician ought to show them or they may be taught from books. Adults are only too prone to lose interest and either give up or do them in a slipshod fashion.

Postural Treatment.—An adjuvant, in cases where the difficulty is in the rectum and pelvic floor, is the postural treatment. Such patients should be made to assume the crouching position

during defecation by sitting on a vessel placed on the floor or by crouching on a high footstool placed in front of the water-closet, or they may cross their legs alternately, one over the other, and lean forward while sitting in the ordinary position. The action of the levator ani, torn during childbirth, can be partly substituted by the following manipulations: The hand is applied to the pelvic floor

Fig. 117.—Bending the trunk forward from the body with the knees held stiff.

between anus and coccyx, so that the anus lies between index and middle fingers, and upward pressure is exerted during the act of straining.

Fecal accumulations in the rectum are very common in atonic constipation. They can be palpated from the outside in the depth of the anal recess and a little to the left of the median line. Patients can be taught to feel these accumulations; they can at the

same time be taught to make deep stroking passes from the tip of the coccyx on the left side toward the anus and thus express the hard masses (Ebstein).

Massage.—The most important mechanical aid in the treatment of habitual constipation is massage of the abdomen. Its aim

Fig. 118.—The body is bent sideways from the hips.

Fig. 119.—The trunk is rotated on the pelvis.

is not simply to squeeze out the intestinal contents (it can never do that), but to excite contractions of the intestinal musculature and systematically train the intestines to normal action. Besides it improves intra-abdominal circulation. There are two forms of abdominal massage in use:

1. The greased hands are carried in small circular pushing mo-

tions from the cecum along the colon to the sigmoid. In addition, the rest of the abdomen is manipulated in various ways (Fig. 123).

2. The hands are held stiff, the finger-tips being applied over the region of the cecum. Slightly increased pressure is exerted until the bowel is caught firmly between the fingers and the posterior abdominal wall. Then slight vibratory pushes are made. After

Fig. 120.—Side-bending and body rotation combined.

Fig. 121.—The thigh is flexed quickly against the abdomen.

one to two minutes the other parts of the colon are thus successively manipulated (Fig. 124). An attempt is also made to grasp the colon between the hands and lift it up (Fig. 125). Deep massage is applied to the flexures of the colon (Fig. 126). The small intestine is similarly handled. Finally, the whole abdomen is shaken with the flat of the hands. This form of massage is more diffi-

cult and exacting on account of the greater resistance which the abdominal walls offer in the beginning, but it is also more effective.

Massage must be practised daily for fifteen to thirty minutes, best in the fasting condition or before retiring, and continued for at least four weeks, then every other day, then twice weekly, and so gradually discontinued. The principal point is to have it carried out by a skilful operator who has not merely a certain technic, but knows what she wants to do and what she can do in a special case. Therein lies the trouble with massage. Many practise it, but "few are chosen." There are too few physicians who have a thorough knowledge of massage; and still fewer who know how to do it. There is no reason why more of us should not learn it and rescue an important branch of therapeutics from the hands of irresponsible individuals.

Fig. 122.—Settling down.

For patients who cannot afford this form of treatment self-massage may be substituted. An iron ball weighing about 6 pounds, sewn up in flannel, is rolled over the abdomen along the course of the large bowel and around the umbilicus for five to ten minutes every morning under moderate pressure by the patient in the recumbent position. Or the patient, while sitting and stooping forward, exerts slight pushing motions against her abdomen with the finger-tips in the same direction as with the ball.

Massage develops and strengthens atrophic or overstretched abdominal muscles; although less efficiently than special gymnastic exercises.

Vibration.—Vibratory treatment is based on the same rationale

as massage. It is indeed an integral part of some forms of massage. But it is usually administered by means of special apparatus, so-called vibrators. The vibrations are given in short or long strokes and with variations of speed and duration. Thereby the effect is modified. Long-stroked vibrations of short duration increase muscular and neural excitability; they have a stimulating, tonic effect. Short-stroked, rapid, and prolonged vibrations diminish excitability and have a sedative calming effect. The

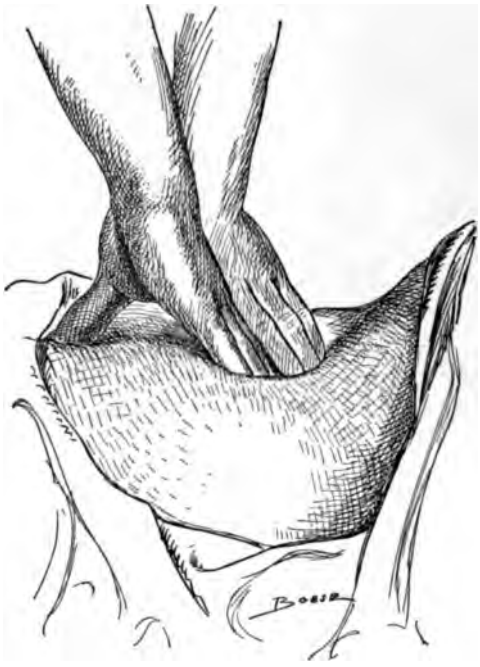

Fig. 123.—With the hands held stiff, circular motions are made over the course of the colon and over the entire abdomen with the palmar surface of the tips of the fingers.

former mode of application is indicated in ordinary atonic constipation. The parts of the apparatus which are applied to the body (vibratodes) are of various shapes, generally hollow metal balls. These are carried over the abdomen in the same way as the hands of the masseur or the iron ball, used for self-massage. The vibratode can also be applied in the rectum, and is then shaped like a hard-rubber bougie.

Abdominal Supports.—For splanchnoptosis congenital or acquired, for pendulous abdomen, for hernia ventralis, a good abdominal binder should be worn. The object of the binder is to lift and support. It should be made of a material which is somewhat elastic but also resistant. It should retain its position under varying conditions. It must be fairly light and easily adjustable and must not spoil the figure, an important item with women. A combination of corset and binder is given in the so-

Fig. 124.—By deep pressure the bowel is caught between the fingers and the posterior abdominal wall.

called Heath corset, a straight-front corset with elastic straps around the hips, which is made to fit tightly at that point, while it fits snugly at the waist and loosely above (Fig. 100).[1]

A good supporter is the "Storm binder" (Fig. 98).[2] In cases of umbilical hernia an umbilical pad may be attached to the binder.

[1] Made by the Pomeroy Company, New York.

[2] Devised and made by Dr. Katherine L. Storm, of Philadelphia, Pa.

Other special pads, such as the much vaunted kidney-pad for floating kidney, are worse than useless.

A. Rose's method of strapping the abdomen with adhesive plaster is highly recommended (Figs. 127 and 128). It has been proved by transillumination of the stomach and by the *x*-ray and bismuth-ingestion that these measures (Rose's plaster straps, Storm binder, etc.) really lift a sunken stomach several inches.

Electricity.—Electricity vies with massage in the treatment of

Fig. 125.—The colon, especially the ascending and descending colon, is grasped between the thumb and fingers of both hands and lifted up.

habitual constipation. It is used in all its various forms with success. Cures have been effected by means of static-wave and the static-induced current and the sinusoidal current. We are most familiar with the old stand-bys accessible to all, the faradic and galvanic currents, and their combination, the galvano-faradic current. Although there is some difference of opinion among authors as to the effect of electricity in general, and on unstriped muscles in particular, the practical results in cases of habitual

constipation remain undisputed. Peristaltic waves have been observed under the application of either current, in people with thin abdominal walls and in hernial sacs.

The currents are applied in various ways to suit indications. Usually one large electrode is placed in the lumbosacral region of the recumbent patient and another medium sized one is carried over the abdomen. In the region of the cecum it is applied with greater pressure and left for a minute; then it is carried along the colon to the sigmoid, where the same maneuver is repeated; then

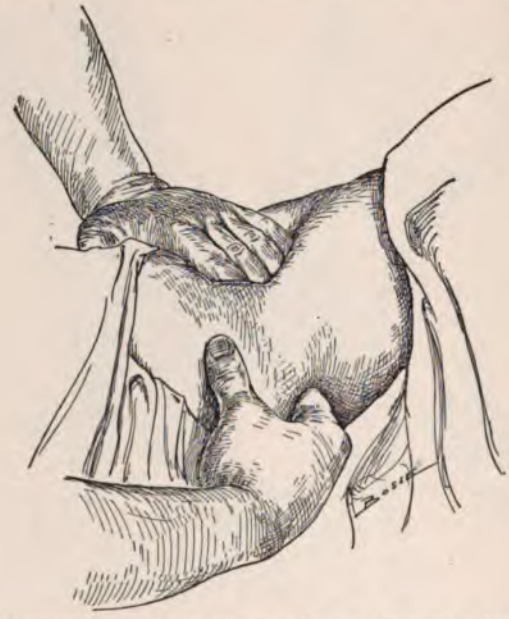

Fig. 126.—Deep massage of the flexures of the colon and the kidney region.

circular or spiral passes are made around the umbilicus. Currents must be strong enough to produce lively contractions of the abdominal muscles. These contractions, however, are not the only object of the application, as they prevent the penetration of the current. Hence the electrode is applied also away from the motor points with considerable pressure. At the end of a session we allow the current to pass between two electrodes of the same size placed over the hypochondric regions. Where the pelvic floor is weak, one electrode may be applied over the perineum. In

overdistention of the rectal ampulla or in prolapsus recti one electrode is applied in the rectum. The cathode has a slightly greater stimulating action wherever applied.

For the faradic current a flexible metal sound covered with webbing up to the tip is used (Fig. 129).

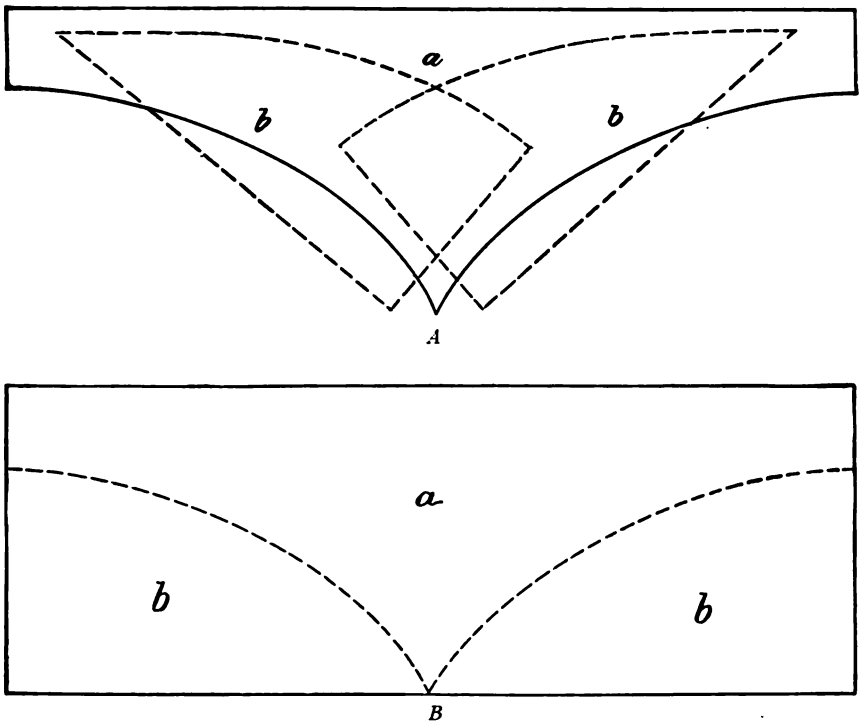

Fig. 127.—Rose's bandage. A piece of rubber plaster, of the average size of thirty-four by twelve inches, is cut as shown by the dotted lines in *B*. The large piece *a* is applied as tightly as possible around the abdomen, drawing it well upward, the two ends meeting or overlapping at the spine. The plaster should not include the crest of the ilium, but should run closely along and above it. The support of the abdominal walls is made perfect by additional application of the two side-pieces of the plaster *b*, *b*, turned in a way as shown by *A*, extending from the hypogastrium over the inguinal and iliac regions, and reaching also to, or near, the spine. In applying the side-pieces we may employ considerable force.

For the galvanic current we need the medium of water to protect the rectal mucosa and evenly distribute the current. Boas' electrode is very suitable (Fig. 130). A substitute may be improvised as follows: A soft-rubber catheter with numerous small holes

is pushed over a copper wire electrode up to the tip, fastened, and then introduced into the ampulla, which has been previously filled with warm salt water. A current strength of 20 to 30 milliamperes is used. The patient ought to feel a marked prickling sensation in the rectum.

The galvano-faradic current combines certain advantages. Here the induced current acts on organs which have been put into a state of increased excitability (katelectrotonus) by the galvanic current, thereby increasing the stimulating effect. Besides, gal-

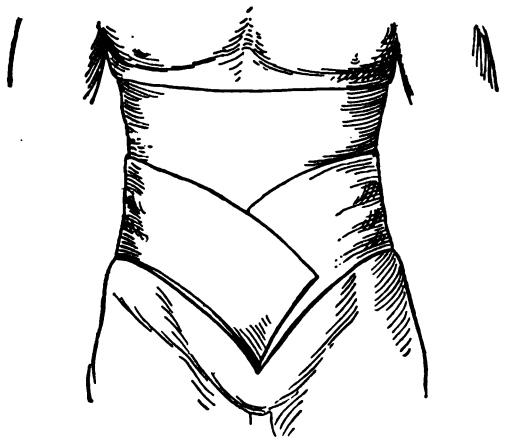

Fig. 128.—Rose's bandage. Most patients bear this plaster without complaining of irritation of the skin, even during the hot weather; a few suffer from itching, especially in warm weather, but not enough to require removal of the plaster; while a very few complain of eczema to such a degree that the plaster becomes unbearable, and has to be removed after a week or two instead of remaining on for five or six weeks, as in the majority of cases. In such instances we may protect the skin by first applying Dietrich's india-rubber plaster with zinc, and the ordinary rubber plaster on top of it.

vanism refreshes the muscles and thus counteracts any fatigue and exhaustion which may follow strong faradization.

The ordinary galvanic or faradic current can be transformed into a sinusoidal current by attaching the two wires from the office-battery and passing the current through the sinusoidal current machine.

This consists of an insulated metal cylinder on which is wound a fine high-resistance wire. On either side of the cylinder are fastened two bars with sliding traveling contacts which are attached to a reciprocating device, driven by a small electric motor for those

who have the street current and a spring motor for those who have the battery current. The sinusoidal current has the following characteristics:

The current of a given polarity increases from zero to a certain

Fig. 129.—Flexible rectal faradic electrode.

maximum, then drops back gradually to zero, when the polarity changes and a gradual increase and decrease of the current takes place, to be followed by an increase and decrease with the original polarity and so on. The strength of the current goes as far in one direction as in the other. The constant change of polarity when using the galvanic current eliminates all electrolytic action; stimulation being the sole property of this kind of current. This current has no equal in its power to contract non-striated muscle fiber; it is therefore without a rival in all atonic conditions of involuntary muscles. It is well to remember the normal rhythm of the particular organ under treatment. This current should not have more than ten to thirty alternations per minute.

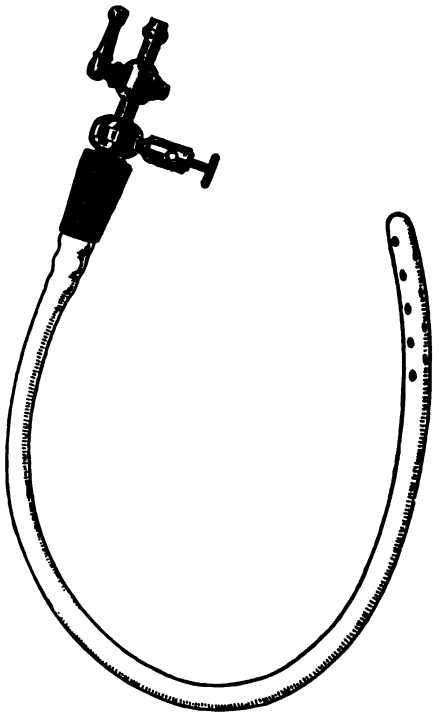

Fig. 130.—Boas' rectal galvanic electrode.

Electric treatment can, if necessary, be entrusted to intelligent patients, which is of advantage in some instances. Compared with self-massage, self-electricity is more valuable.

Hydrotherapy.—We use general and local, internal and ex-

ternal hydrotherapy in habitual constipation. We have already mentioned the importance of drinking water freely. We may add that gastric lavage or douching with normal salt solution (or Wiesbadner Kochbrunnen) has been recommended for the cure of this trouble. From ½ to 1 pint is allowed to run in and out by alternately raising and lowering a funnel connected with a stomach-tube. This procedure excites active intestinal peristalsis, and if practised daily for several weeks may accomplish permanent results. It is especially indicated in complicating nervous anorexia, nervous anacidity, and subacidity.

The introduction of water into the lower bowel is one of the most

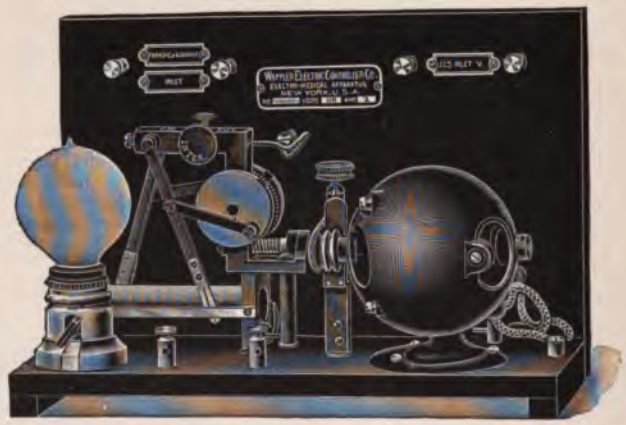

Fig. 131.—Attachment to be connected with any battery for the production of the sinusoidal current.

popular theraupeutic measures. It is performed in various ways and is easily modified according to the end in view. We may use small or large quantities of water of varying temperatures; in short or long intervals; under high or low pressure; in different positions of the patient and with various additions, as salt, soap, glycerin, oil. The most common indication is coprostasis, acute or chronic. Here the injection softens the feces, thereby facilitating their expulsion, and excites peristalsis of the lower bowel. The best and simplest form of an evacuating enema for an adult is the injection of about one pint of water at 80° to 95° F. with the addition of a little soap, administered from a fountain syringe in the

recumbent position and retained as long as possible. These injections may be used over long periods of time without doing any harm. Or the patient injects 6 to 10 ounces of warm water with a teaspoonful of green soap or glycerated soap and retains it overnight, whereby hardened masses are softened and peristalsis of the lower bowel is greatly excited.

Of external local applications we employ abdominal douches, compresses, and sitz-baths or hip-baths. Sitz-baths or hip-baths powerfully influence the innervation of the abdominal and pelvic organs and the capacity of the abdominal vessels, the largest blood-reservoir of the body, the filling of which to a great extent controls the general circulation and blood-pressure.

Cold or very hot hip-baths contract the abdominal vessels, driving the blood to other parts, as evidenced by congestion of the head, increase of axillary temperature, lowering of the rectal temperature. If this thermic irritation lasts but one to three minutes, prompt reaction ensues, that is, active hyperemia of the abdominal organs takes place.

Short, cold hip-baths from 50° to 68° F. are therefore indicated in all conditions of the abdominal organs which are due to anemia, venous stasis, motor and secretory insufficiency, torpid metabolism; for instance, in atonic constipation.

Abdominal compresses, in the shape of wet dressings (Priessnitz compress, Neptune's girdle) (Fig. 115) worn overnight, allay the manifold unpleasant sensations which interfere with the comfort or sleep of patients suffering from organic and functional gastro-intestinal disorders.

A Scotch douche, *i. e.*, alternating hot and cold, jet and fan douche on the abdomen, is a powerful stimulus to peristalsis. The same effect is produced by the ether-douche (Boas): once or twice a day for about five minutes the abdomen is sprayed from an atomizer with 100 c.c. pure sulphuric ether.

All these local applications are very advantageously combined with general hydriatic procedures. Thus the short, cold hip-baths are preferably followed by a douche of gradually reduced temperature or a Scotch douche on the abdomen, and later by a stimulating douche to the entire surface. Affusions of the abdomen of cold water from a good height are preferably combined with

half-baths of 85° to 80° F. It is positively established that the best effects of hydrotherapy are brought out by applications to the entire surface, viz., its effect on circulation, respiration, and innervation, over-secretion, and excretions.

General hydrotherapeutic procedures find their greatest field of usefulness in chronic disorders of the gastro-intestinal tract, especially the functional ones, be the latter a manifestation of neurasthenia or hysteria, or the primary cause of the disturbance of the cerebrospinal centers. Such measures are graduated douches (circular, jet, and fan douche) of one to two minutes' duration and 30 to 40 pounds' pressure, preceded by artificial warming of the body and followed by friction—best carried out in special institutions.

For home use the following measures are indicated:

Ablutions by means of a rough towel, a bath glove, or the hand with water at 80°, reduced gradually two degrees each day down to 60°; affusions with water at the same temperature; the drip sheet from 70° to 50°, followed by a half-bath from 85° to 80°. We employ one or other of these applications, according to whether symptoms of irritation or depression predominate in the particular case and whether the patient is poorly or well nourished, anemic or plethoric. The great advantage of hydrotherapy is that it can be so modified as to suit almost any case and condition where it is at all indicated.

Spastic Constipation.—This brings us down to a brief consideration of spastic constipation. Where the spastic phenomena are predominant and recur frequently, the treatment must differ in many essential points from the one hitherto outlined for the atonic form. Everything must be done to allay spasm and soothe an overexcited nervous system. Cold hydriatic procedures are contraindicated. Warm full baths, or sitz-baths, or a hot-water bag on the abdomen, are very acceptable; also injections of warm water with the addition of aromatic substances, or the drinking of large quantities of hot peppermint, fennel, or camomile tea. Electricity and massage are out of place. The diet should not contain coarse substances, which act mechanically through a bulky residue, but chiefly such as exert a chemical action.

Much rest is essential for these cases, even resting in bed. A

change of scenery is often of great benefit. Sanatorium régime generally surpasses home treatment.

Oil enemata find here their greatest usefulness, more so than in the ordinary form, where they are also largely used, and justly so. About 8 ounces of warmed pure oil (olive or the cheaper sesame oil) are introduced into the bowel by means of a rectal tube and funnel or a hard-rubber hand syringe (4 ounces) applied by the patient himself or by an attendant (Fig. 117). The patient should lie on the back or the left side with the head low and the pelvis high, and not rise for some time after the injection, in order to give the oil an opportunity of evenly distributing itself over the colon. (It has been found at operation oozing out from a perforated appendix.) It is therefore best given after retiring; every night for two weeks, then every other night for one week, then every third night for one week, then twice a week, then gradually discontinued. If 8 ounces act too strongly, the quantity should be reduced; if not acting sufficiently, it is increased. Should there be no movement after breakfast the following morning, a small injection of warm soapsuds is administered. There will be no soiling of the bed if the injections are given *lege artis*. Where one is not sure of that, we advise the wearing of an anal pad held in place by a T-binder.

In spastic constipation drugs are frequently needed, not the usual purgatives but rather sedatives: for the local effect belladonna and opium, for the general effect bromids. The former are given per os or as suppositories, alone or combined, in medium or small doses several times a day. They regulate disordered innervation so that movements take place without other measures being resorted to (*cf.* lead-colic). We have also heard patients assert that under a course of bromids bowels formerly sluggish resumed natural action.

Suggestion plays a great rôle in the treatment of the sick. We have already spoken of the necessity of the formation of a regular stool habit. This is psychic treatment. In very obstinate cases of habitual constipation which have resisted all therapeutic endeavors, hypnosis has effected cures. It is indeed regrettable that hypnotism is practised by irresponsible people, and that so much mystery and charlatanism are being attached to it.

Psychotherapy is in its infancy in this country, and only recently

has it been taken up by physicians. We do not doubt that many cases of habitual constipation would be amenable to this treatment.

Drugs.—Medicinal treatment is considered last because it does not cure the atony of the intestinal musculature nor regulate the faulty innervation of the colonic and rectal peristalsis. It is merely palliative. The guiding principle should be to do without cathartics wherever possible. We do not absolutely oppose the use of drugs, but we advise their employment only on good indications. Let us bear in mind two simple facts: First, that there is no fundamental difference between the laxative effect of stewed prunes from the kitchen and that of tamarinds or manna from the drug-store. Second, not a few individuals take their daily dose, year in, year out, with good effect and without harm to the system or aggravation of their intestinal sluggishness.

Purgative drugs are indicated in the treatment of habitual constipation:

(*a*) In the beginning of a systematic cure, in the case of drug habitués.

(*b*) Where the hygienic, dietetic, and mechanical treatment is ineffective.

(*c*) Where such treatment cannot be carried out.

(*d*) In the aged, whereas in children and adolescents their habitual use cannot be too strongly condemned.

(*e*) In complicating diseases, chronic heart disease, arteriosclerosis, kidney disease, diabetes, plethora, during pregnancy and acute intercurrent conditions requiring rest in bed.

Whenever compelled in these cases to use drugs, we should observe the following rules:

1. Always select the mildest aperients; avoid drastics.
2. Find out the proper dose.
3. Use them intermittently; *i. e.*, try from time to time to omit them and get along with the physiologic methods.
4. Change off between the various suitable remedies so as to avoid habituation and an accumulation of unpleasant by-effects.
5. Select those which produce soft, abundant movements without inconvenience.
6. Give them in a pleasant convenient form.
7. Combine several of them if you see fit. (Single drug prescriptions may be highly scientific, but are often impractical.)

The following drugs are at our disposal for prolonged use:

Castor oil, rhubarb, senna, aloes, podophyllin, cascara, sulphur, salts, and a few modern preparations, such as purgatin, purgen, exodin, regulin. Their choice is governed by their pharmacologic action and by the requirements of the case. They all act ultimately by stimulating peristalsis. Occasionally and for special reasons calomel or one of the drastics may become necessary, like jalap, colocynth, scammony.

Oleum ricini (1 dram to 1 ounce) is perhaps the mildest of all, tasteless when given in large soft capsules, and rarely fails. It passes the stomach unchanged and is split up and saponified by the bile and pancreatic juice; a part of it escapes unchanged into the lower parts and acts as a lubricant. It can be given even in complicating catarrhal conditions and is especially indicated where constipation and diarrhea alternate and colic is frequent.

℞. Ol. ricini.
Syr. rhei. aromat.....āā ℥j (30.0)
S.—℥j (4.0) every three hours.

Rhubarb, senna, and cascara contain as active principle cathartin or cathartinic acid, an acid colloid glucosid which is split up by the pancreatic juice into chrysophanic acid and emodin, both anthracen-derivatives. The former is excreted in the urine and gives rise to a red or, in the case of cascara, a stronger yellow color on addition of an alkali.

Rhubarb: Some patients chew a piece of the root daily for indefinite periods with good effect. The drug contains a bitter principle to which its action as a stomachic is due, and a special tannic acid which accounts for its constipating after-effect. It is often combined with other aperients, like castor oil, aloes, or salts.

Pil. rhei co. (U. S. P.) contains about gr. ij (0.13) of rhubarb, gr. iss (0.1) of aloes. Two are taken at night. It acts in ten to twelve hours.

℞. Pulv. rad. rhei.....℥j (30.0)
Sod. sulph.....℥j (30.0)

Or—

℞. Pulv. rad. rhei.....℥j (30.0)
Potass. bitart.....℥ij (60.0)
Sulphur. sublim.....℥ij (60.0)
S.— ℥j at bedtime.

Our domestic rhubarb-plant possesses no laxative properties.

Senna: Acts in three to four hours when given alone in full doses. It is the active agent in most of the popular teas and nostrums.

Pulvis Glycyrrhizæ Compositus (U. S. P.) is used extensively. We prefer to give it to patients suffering also from chronic bronchitis and emphysema. It was formerly used as an expectorant on account of its containing licorice and sulphur. Dose, ʒj (4.0).

Syrupus Sennæ Aromaticus (N. F.) and *Syrupus Sennæ Compositus* (N. F.) are pleasant and appropriate. A few senna leaves placed in a muslin bag and stewed together with prunes impart to the latter its cathartinic acid and materially enhance their laxative action.

Injusum Sennæ Compositum (U. S. P.) contains, besides senna, twice the quantity of manna and magnesium sulphate, and is only adapted for occasional strong action, *e. g.*, in the lying-in period, when it is very effective in 2-ounce doses.

Cascara Sagrada: at present perhaps the most popular laxative prescribed by physicians. It acts mildly during the night. The dose of the fluidextract (ʒj) can be easily regulated according to the effect produced, a great advantage when we wish gradually to wean an habitué. The solid extract is given in 2- to 5-grain pills (0.12 to 0.3).

Aloes: is an ingredient of almost all patent pills and of many of the officinal preparations.

Pilulæ Aloes (U. S. P.).

Pilulæ Aloes et Mastiches (U. S. P.).

Pilulæ Aloes et Myrrhæ (U. S. P.).

Pilulæ Aloes et Podophylli Compositæ (N. F.).

Pilulæ Aloini Compositæ (N. F.).

Pilulæ Aloini Strychninæ et Belladonnæ (N. F.).

Pilulæ Aloini Strychninæ et Belladonnæ Compositæ (N. F.).

Pilulæ Laxativæ Post Partum (N. F.).

The multiplicity of these officinal pills testifies to the good qualities of aloes and its active principle, aloin. They act exclusively on the large bowel in from twelve to fifteen hours. Bile seems to be necessary to bring out the effect. There is apparently no habituation and no increase in dosage necessary. In full doses aloes produces hyperemia not only of the lower bowel but of the

pelvic vessels, which precludes its employment during pregnancy and the puerperium and permits of it only in small doses during menstruation.

Podophyllin: A reliable purgative in doses of gr. $\frac{1}{4}$ (0.015), laxative in doses of gr. $\frac{1}{10}$ (0.006) as resina podophylli U. S. P. It is rarely used by itself. It is a good cholagog.

Sulphur, given in dram doses, in the form of sulphur lotum, sulphur precipitatum (milk of sulphur), sulphur sublimatum (flowers of sulphur), or as the popular sulphur and molasses, or combined with salts, *e. g.*, cream of tartar. When finely subdivided it passes the stomach unchanged and is transformed in the intestines into hydrogen sulphid and then into potassium and sodium sulphid, strong peristaltic stimulants. But as this change is very gradual there is no purgation; the feces are simply rendered soft. Hence its popularity in hemorrhoidal troubles.

It appears from the above prescriptions that combinations are much in vogue, that there are enough officinal formulas to suit almost any condition, and that physicians have, therefore, no justification or excuse for prescribing patent or proprietary preparations if they do not want to make combinations of their own.

The following drugs are frequently combined with purgatives proper:

Strychnin sulphate (gr. $\frac{1}{60}$ to $\frac{1}{30}$) or extract of nux vomica, up to $\frac{1}{2}$ grain in one pill, for its general and local tonic effect.

Atropin sulphate (gr. $\frac{1}{100}$ to $\frac{1}{50}$) or extract of belladonna up to $\frac{1}{4}$ grain, or extract of hyoscyamus up to 1 grain, to combat spasm or prevent griping.

Physostigmin salicylate (gr. $\frac{1}{60}$) or extract of physostigma (up to gr. $\frac{1}{6}$), to prevent or combat meteorism.

Pulvis capsici up to gr. 1, to stimulate gastric secretion.

Asafetida, myrrh, mastiche, in 2-grain doses, or the various ethereal oils in drop doses to prevent flatulence.

As previously mentioned, rhubarb, senna, rhamnus, and aloes contain anthracen-derivatives as active agents. An attempt has lately been made to manufacture synthetically anthracen-derivatives with purgative properties. The result of these endeavors is purgatin or purgatol, exodin, and purgen. Purgatin, a light yellow powder, insoluble in water, produces good evacuations without

griping, in twelve hours if given in doses of 8 to 30 grains (0.5 to 2.0); it colors the urine a Burgundy red.

Exodin, a greenish-yellow tasteless powder, insoluble in water, made in 7½-grain (0.5) tablets, is highly lauded by Ebstein as an adjuvant to oil-enemata in fecal impactions.

Purgen, the well-known indicator phenol-phthalein, is sold in tablets of 0.05 to 0.1 to 0.5 g.; it colors the feces red.

Salts: Sulphate of soda (Glauber's salt), sulphate of magnesia (Epsom, bitter salt), phosphate of soda, oxid and carbonate of magnesia, bitartrate of potash (cream of tartar), tartrate of potash and soda (Rochelle salts), Sal Carolinum factitium (N. F.) (Carlsbad salts).

They stand between the mild aperients, calomel and castor oil, on the one hand, and the drastics on the other. They are absorbed with great difficulty from the stomach and intestines. They hold the water in which they are dissolved and prevent its absorption. The contents of the small intestine arrive in the colon in the fluid state and here escape inspissation, as the greater part of the salts remains unabsorbed and passes out. They furthermore mildly stimulate the intestinal mucosa and thus reflexly excite peristalsis. They should therefore be given diluted, preferably in the form of the natural mineral waters. They should not be given to bed-patients for long periods because with enforced rest the stomach does not empty itself promptly, and the salts are retained and depress the secretory functions of the stomach.

For systematic use Glauber, Epsom, and Carlsbad salts are best administered in the fasting state, followed by a walk or some exercise, which accelerates their action. This is the common practice at health-resorts. These drinking-cures do not cure, they do not affect the underlying condition of habitual constipation, they are merely palliatives. In sending our well-to-do patients to Marienbad, Karlsbad, Tarasp, Kissingen, and Saratoga, we desire them to reap the added benefits of the many coincident factors of such a cure.

Lean and weakly individuals, old people, convalescents, lying-in women, should not use the "middle salts" for prolonged periods, because with the accelerated passage of the intestinal contents much water and nutritive material passes out and is lost. Salts

and mineral aperient waters are better adapted for fat or plethoric individuals, for whom this incidental effect is rather an advantage. The various salts are selected according to their additional pharmacologic properties which may be desirable in a special case of habitual constipation. Thus, magnesia usta and carbonica are given when we wish to neutralize a surplus of hydrochloric acid in the stomach; cremor tartari, when we wish a mild diuretic action; phosphate of soda for its action on the liver, and for its supposed inhibiting action on the symptoms of Graves' disease. The sulphate of sodium and magnesium carry out of the system a great deal of water, not only the water needed for their own solution but also that present in the intestinal tract, and are therefore indicated in congestion of the abdominal viscera and in inflamed hemorrhoids, as well as in renal insufficiency (vicarious action). They are supposed by some to have a specific antitoxic effect on intestinal autointoxications, a still unproved hypothesis. After all that has been written on the subject, one fact stands out prominently, namely, that a good purge is the best intestinal antiseptic.

Magnesium sulphate in 15-grain doses, together with 3 drops of aromatic sulphuric acid or dilute hydrochloric acid, every two or three hours, is a favorite remedy in lead poisoning, in uncinariasis, and in dysentery.

Carlsbad salts are composed of sodium chlorid 18 per cent., sodium bicarbonate 36 per cent., sodium sulphate 44 per cent., potassium sulphate 2 per cent., a happy combination which fulfils various indications. Being devoid of irritating properties, they can be given in gastric ulcer with hyperchlorhydria for their antacid effect; but they are especially indicated in catarrhal conditions of the intestinal tract, which are not infrequently associated with habitual constipation, and especially in catarrh of the duodenum and of the large bile-passages. This explains their helpful action in catarrhal jaundice and in cholelithiasis (indirect cholagogs). Their popularity in gout and diabetes is due to their "salt" and "alkali" effect, which are supposed to increase the oxidation-processes in the system.

Nearly all salines can be given in the form of effervescing solutions whereby their palatability is improved and their purgative effect enhanced through the action of the carbon-dioxid gas.

Regulin and pararegulin are preparations introduced by A. Schmidt for the regulation of sluggish intestinal action, due to an unusually vigorous digestion and assimilation (*cf.* Etiology). Regulin is agar-agar with 20 per cent. cascara extract; it is non-absorbable, swells up in the intestinal canal, and acts principally by its bulk and by its retention of water. Pararegulin is liquid paraffin with 10 per cent. cascara extract, given in teaspoon doses.

The rationale of such popular remedies as vaselin, linseed, or the French grains de lin de Jarin is based on the same principle.

Yeast, in the shape of brewers' yeast, in compressed cakes, or as cerolin (yeast fat) in 2-grain pills, has been recommended for habitual constipation, especially when it is accompanied by acne or furunculosis.

Small doses of pure cultures of coli bacilli in capsules have also been recommended, on the supposition that the bacterial flora, when made sufficient, produces the proper amount of fermentative and putrefactive substances necessary for natural peristalsis. A similar idea underlies Metchnikoff's plan of gradually supplanting the ordinary intestinal bacteria by lactic acid bacilli. This may be brought about by the prolonged daily consumption of sour milk.

The rectal application of drugs deserves special consideration. We have already mentioned the use of enemata containing salt, soap, glycerin, oil. We have discussed oil-enemata. Boas recommends instead an enema consisting of 8 ounces of water, a small amount of baking soda, 2 tablespoonfuls of cod-liver oil, and 2 tablespoonfuls of castor oil, the whole well emulsified. Glycerin is used extensively either in suppositories or, if a stronger or more certain action is required, in tablespoon doses by means of a special syringe (Fig. 132). Glycerin acts as an irritant to the rectum on account of its hygroscopic properties. Magnesium sulphate, dissolved in water, is given per rectum alone or with glycerin, oil, soap, or oxgall.

Aloin (gr. 6), cathartin (gr. 8), colocynthin (gr. $\frac{1}{6}$), citrullin (grain $\frac{1}{3}$), dissolved in a little water or dilute alcohol or glycerin and injected into the rectum (micro-clysters), are said to produce prompt evacuations even in obstinate cases. These drugs are expensive, except aloin, which may also be given in suppositories.

For prolonged use only pure oil or emulsions of oil and perhaps of glycerin are approved.

Flatow has recommended the insufflation of 1 dram of boric acid into the rectum by means of a powder-blower; this is worthy of trial. The drug can also be given in the form of suppositories of 15 to 45 grains (1.0 to 3.0).

Rectal bougies, 1 foot long, of hard rubber with a central channel, are also used for the relief of habitual constipation. They mechanically excite rectal peristalsis and overcome sphincter spasm. Hence their indication is limited.

Old hardened masses sometimes have to be taken out of the rectum with the fingers or by specially constructed spoons or scoops.

The operative removal of hypertrophic rectal folds is merely mentioned for completeness' sake. If they really do cause constipation, it is a secondary or symptomatic form and does not strictly belong to our subject.

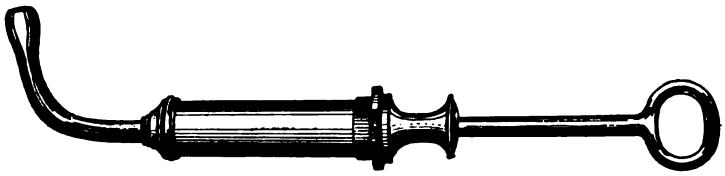

Fig. 132.—Rectal syringe for small glycerin and medicated enemata.

Résumé.—What measures shall we use in a specific case of constipation? This depends entirely upon the nature of the case and on special circumstances We must individualize. A mild case in a young person may be cured by the correction of faulty habits and the institution of a proper diet. Gymnastics are next in order. Then a course of oil injections should be tried.

More severe cases require, in addition, massage and electricity.

It does not depend so much upon the method which is used as upon its methodic and prolonged employment.

In obstinate cases we combine dietetic and mechanical means with hydrotherapy. We employ drugs only on the strictest indications. It is through the choice and combination of the proper measures that skill, experience, and medical instinct triumph.

Vulvovaginitis.—A purulent vulvovaginitis is not very rare in children. It is due, in the vast majority of cases, to the gonococcus.

On inspecting a specific case there will be seen a profuse yellow-green discharge, which accumulation is greatest in the upper portion of the vulva and about the clitoris, in which area the discharge is also thicker and drier. The vulva itself, external to the large labia, is red, inflamed, and edematous, pitting on pressure. The main irritation is in the immediate circumference of the hymen, on the inner lining of the small labia, and on the perineum and fourchet. The sulci between the smaller labia and the future labia majora are much affected, being of a very dark red color, often with a deep bluish tinge. The vagina is generally involved. If treatment be devoted mainly to the vulva alone, improvement is therefore relatively slow. The opinion of many that the specific form is simply a vulvitis and not a vaginitis is decidedly wrong. While this is true in some cases, it is by no means the rule, as I have several times disproved by first washing the vulva and outer end of the vagina thoroughly and then observing the expression of pus from the vagina when the child cried or resisted efforts at treatment.

The main evident lesion in gonorrheal vulvovaginitis is the inflammation immediately about the hymen, on the inner surface of the labia, and on the perineum. Frequently the cutaneous covering of and about the external genitalia is likewise affected. No matter how thoroughly the deeper vulvar lesions are treated, unless the entire skin periphery be likewise treated secretion will continue. The red, irritated character of the skin covering of the vulva is not due alone to irritation by the secretion, but to an actual destruction by the gonococci of the superficial layers of the epidermis. During the acute inflammatory stage the area surrounding the clitoris is least affected.

Etiology.—Infection may come from contact with linens,

towels, and sponges used by adults or children suffering from gonorrhea. In hospitals infection of children in the wards readily takes place in this way. Probably a frequent source of contamination in hospital wards is furnished by the fingers of nurses who attend to an infected case and then, without sufficient precaution, arrange the toilet of the next child. The use of the same thermometer on several children in succession may also be the source of infection, for the thermometer is probably often passed over the vulva or even into the vagina in an attempt to take the rectal temperature. Care is necessary, in the first examination, to determine if any attempted violence has produced local lesions beyond those of the infection—a factor which often explains the etiology. It is by no means easy to determine this fact, for penetration of the vagina need not occur. An attempt may have been made without injury or penetration, yet producing infection. A method which has served me, however, is the irrigation of the hymen with a large stream of water under mild pressure. The normal hymen is then brought into undulation and its margin is distinctly outlined. Any tears or lesions will be evident as irregularities or interruptions in the normal unbroken edge of this structure.

Histopathology.—When gonococci grow on a mucous membrane they pass down between the epithelial cells, down to the connective tissue. There is a decided exudation of leukocytes from an extensive periphery into the connective tissue and through the epithelium. There is a vast difference depending on the character of the epithelium. In adults the urethra and cervix are readily infected because the cocci pass down easily between the cells arranged in palisade form. The vagina in adults is but slightly involved, because the vaginal epithelium is hard, dry, not arranged in palisade form, and therefore not readily entered. In the case of squamous epithelium, the softer and thinner it is, the more easily does the gonococcus invade it. That is why the tender covering of the vulva and vagina in children is easily invaded. Mandl found in sections made through the vaginal mucosa in a case of gonorrheal vaginitis: (1) surface epithelium gone; (2) all the epithelium gone in spots; (3) gonococci entering into the epithelium in rows and bands; (4) the gonococci very deep in the tissue in spots and extending beyond the epithelial limit. Though the gonococci were generally in the superficial connective tissue,

in certain areas they were deeply embedded. The granular character of the vagina, in the gonorrheal vulvovaginitis of children, makes it evident that the pathology of the lesions is the same as in this severe case in adults.

Examination of the Vagina.—Owing to the admirably reflected light of the Ferguson speculum, I have devised a smaller speculum on the same plan, which is used for the same purpose in children. In them the vagina is long and of a curved course. It is remarkable how distinctly the color and the character of the vaginal lining may be seen through the small speculum, and the tiny cervix, with its tiny opening, can be distinctly brought into view. In this way too, quite naturally, applications of fluid or the use of a swab may be carried out in the same manner as in adults and a vaginal bath with any desired liquid may be given with the greatest of ease, limiting its action completely and preventing any undesired irritation of the vulva, perineum, vestibule, or urethra. On the use of the small speculum (Fig. 41) the red and inflamed character of the vaginal lining and the erosion of the tiny cervical os and the presence of cervical pus are very distinctly recognized.

Involvement of the anus and rectum may take place. In some cases purulent secretion is found exuding from the anus and examination shows the presence of gonococci, with involvement of the rectum. Ulcerations result, often accompanied by the passage of blood, on the basis of which the diagnosis of proctitis is made. In other instances the lesions are of a more acute character. Minute fissures are present in the anal margin, causing pain and the passage of blood on defecation.

Condylomata.—Continued irritation of the tissues leads to the same local anatomic lesions as occur in adults. Condylomata may be found on the perineum, on the large labia, and especially on the skin surrounding the clitoris, which in children is relatively large and thick. Condylomata may also be found in the neighborhood of the anus.

Involvement of the Urethra and Bladder.—The urethra is not rarely involved in the gonorrheal process. That the bladder may be involved is shown by a case of purulent cystitis in a nine-year-old child, in which Wertheim found only gonococci. Gonococci were obtained in the cultures made from an excised piece of

the bladder mucosa. Microscopic examination of the specimen showed: (1) gonococci between the epithelial cells; (2) gonococci extending in rows into the subepithelial connective tissue and lying almost entirely extracellular; (3) the surface of the mucosa covered with fibrin layers; (4) gonococci in the blood-vessels.

The uterus, tubes, and peritoneum may be involved in children. Through upward extension of the gonococci there may occur purulent involvement of the tubes, and pus is then poured out into the peritoneum, producing pelvic or even a general peritonitis. Such cases in children of five, six, seven years of age and older are generally diagnosed as appendicitis. In every case of peritonitis in female children a vulvovaginal discharge should be looked for and a microscopic examination should be made. Goodman says: "Wertheim noted that peritonitis produced by the gonococci is accompanied by a greater exudate than that produced by other organisms. A child thus affected becomes feverish and looks ill. The temperature is generally not high, ranging between 100° and 102°. The pulse may be as high as 140. There is often vomiting and abdominal pain. The abdomen is unusually distended and tympanitic. No tumor can be felt. The rigidity of the recti is not marked. The picture is that of a general peritonitis, but to the clinical eye it does not carry the same conviction of severity as noted in severe appendicitis or intussusception. Some observers, however, mention the sharp and intensive onset and the serious aspect. The intestines are distended and injected. There is seropurulent fluid, there is pus in the pelvis, there are accumulations of lymph on some coils of the intestines." A diffuse gonorrheal peritonitis generally progresses favorably, with palliative or symptomatic treatment. Operation may be deemed necessary if the severity of the onset suggests a mixed infection. In a collection of eighteen cases of diffuse general gonorrheal peritonitis in which the gonococci were found on operation (collected by Dr. Chas. Goodman) the mortality was two cases. In the mixed infections there may be involvements of the lung, such as bronchopneumonia or empyema, but these do not occur with pure gonorrheal peritonitis.

In other cases closure of the abdominal end of the Fallopian tubes takes place and varying degrees of pyosalpingitis may result. A not infrequent sequela of the milder extension to and involvement

of the peritoneum and ovaries is the formation of tubo-ovarian cysts with marked adhesions, which may give no symptoms until the child reaches the period of menstruation or later.

Constitutional involvement may occur from any point, in the form of endocarditis, joint or periosteal involvements, and even meningitis.

Treatment.—For the vulvitis I paint the areas thoroughly with a 10 per cent. silver solution, which, strange to say, causes relatively little pain. All the areas up to the hymen must be thoroughly painted and the sulci between the inner labia and the outer, the perineum, and the outer surface of the hymen must be thoroughly treated. The child should, once or twice a day, be seated for fifteen minutes in a very warm sitz-bath, for the purpose of removing, as far as possible, the superficial desquamating layers. During the entire period, between treatments, and best applied immediately after the bath, a 2 per cent. protargol ointment, freshly made, is an ideal external medicament.

For irrigating the vagina I use a thick rubber tube with a lumen one-third of an inch in diameter. Into this I insert a urethral rubber catheter, leaving one or two inches extending beyond the end of the rubber tube. The catheter is then inserted into the vagina for the purpose of irrigation. The thick rubber tube which covers the catheter is pressed closely against the hymen and the outer end of the vagina, prevents the outflow of fluid, and thoroughly distends the vagina with the irrigating medium. On gradually releasing pressure by the outer tube, the fluid makes its exit without squirting into the face of the attendant. If, then, the speculum be introduced, and the fluid be removed by thin swabs, a clear picture of the local lesions can be obtained, and the treatment to be mentioned can be applied.

So far as the vagina is concerned, these cases are treated by daily irrigations with bichlorid of mercury 1 : 5000, or by irrigation with boracic solution and the subsequent instillation with a curved eye-dropper of several tubes of 1 per cent. protargol. The treatment in the later stages consists of the injection of a 1 per cent. silver solution. A very good ambulatory treatment consists of the irrigation, every day, with boracic solution, followed by the injection of protargol solution or by a protargol vaginal bath per speculum, and at later stages by the washing of the entire

vaginal canal with 1 per cent. silver with the aid of the speculum, and repeating this three times a week. In the very chronic cases a stronger solution of silver than 1 per cent. must be used through the speculum. The hymen of the child is very thin and very elastic, quite as elastic as the foreskin of the male. In the numerous instances in which I have used the curved eye-dropper or vaginal speculum, I have never found difficulty, even in the smallest children, in entering the vagina, nor have I ever torn any tissues or produced any bleeding.

The external genitalia may be washed with bichlorid of mercury 1 : 2000. The vagina is then irrigated with 2 quarts of a weak solution of permanganate of potash, followed by the injection of several pipetfuls of a 10 to 40 per cent. solution of argyrol. This is done twice a day.

We may irrigate with 2 quarts of saturated boric acid solution and then inject several pipetfuls of a 1 per cent. solution of nitrate of silver. This is done twice a day until two weeks after the discharge ceases and no gonococci are found. Then continue the irrigation with boracic acid and use 2 to 5 per cent. silver nitrate.

For the associated urethritis in children Sheffield uses the following urethral pencils introduced twice a day into the urethra:

℞. Protargol..... gr. iij (to gr. xv)
Iodoform..... gr. xv
Bals. Peru..... gtt. vij
Ext. bellad..... gr. j
Ol. cacao..... q. s.
F. crayons (2 inches long, $\frac{1}{8}$ inch thick) no. xv.

Urethral pencils may be made as follows:

℞. Ichthargan..... gr. $\frac{1}{10}$
Ol. cacao..... ℥iss
F. urethral bacilli (2 inches long, $\frac{1}{8}$ inch wide) no. xii.

For the treatment of rectal gonorrhea the rectum should be irrigated three times a day with any of the following solutions, after first cleansing with a normal saline enema: $\frac{1}{5}$ to $\frac{1}{2}$ per cent. protargol; $\frac{1}{5}$ per cent. albargin; 1 : 4000 argentamin; 1 : 5000 permanganate of potash.

With the aid of the small vaginal speculum the various silver salts may be directly applied to the rectum in stronger concentration. Old stubborn cases demand the use of the Paquelin cautery applied to fissures and ulcerations.

Improvement is evident: (1) by the character of the secretion, which gradually becomes paler and thinner, and less in amount; (2) by the gradual disappearance of the red inflamed character of the acutest lesions and the resumption of normal color on the dermal covering of the vulva; (3) by the healing of the vaginitis and the cervical erosions. The cure of a vulvitis of specific character would not be difficult. Generally we are dealing, however, with an invasion of the vagina and cervix, and absolute and complete rest in bed is essential to an early cure. A cure within six to twelve weeks may take place, with almost daily treatment. If the cervix is involved or if the vagina is deeply involved, recurrent virulent attacks may occur after symptomatic cure, though it is impossible to deny that in some cases a repetition of the original etiologic factor may have taken place. Ambulatory treatment is unsatisfactory. These should be hospital cases. The treatment which has given the best results in their cases is local treatment plus vaccine treatment. Added to this local treatment, gonococcus vaccine may be given, beginning with doses of 50,000,000 and increasing 25,000,000 until 400,000,000 is reached. The vaccine is to be given once a week, or else twice a week, with less rapid increase in the dose. In only a few cases is there an entire clearing up of the discharge, and some of these have a return sometime within two years. So far the vaccine has not proved itself a specific by any means.

Constitutional Treatment.—However, in the words of Bumm: "All gonorrheas heal, if they do heal, finally through the natural reaction of the infected tissue. Without this help the complete elimination of the gonococcus is impossible. Most unpromising, therefore, are the chronic cases (in the cervix and uterus) in which the tissue is accustomed to the gonococcus and in which the mucosa epithelium, through long irritation, has undergone metaplastic change to stratified squamous epithelium and only a slight secretion is found, consisting mainly of squamous epithelium. The cocci diminish or disappear under treatment, but on cessation of the latter reappear. Therefore constitutional treatment is often necessary."

The typical characteristics of virulent gonorrhea are: (1) an acute beginning; (2) a chronic course; (3) resistance to treatment;

(4) virulence in new areas or new media for a very long time; (5) probable extension in continuity; (6) possible constitutional involvement.

The pathology of various lesions of acute gonorrhea shows the possibilities to be: (1) superficial involvement of the mucosa; (2) deep involvement extending into subepithelial connective tissues; (3) abscesses; (4) metastases; (5) constitutional involvement; and (6), which is very important, the early formation of adhesions. When these occur in the lower genital region, atresia or stenosis of the vagina or cervix may result.

GONORRHEA IN ADULTS

URETHRITIS

Acute Gonorrheal Urethritis.—In acute gonorrheal urethritis the lining of the urethra is diffusely red and swollen. The external meatus of the urethra is swollen and edematous. There is a purulent discharge. The urethra, when felt through the vagina, is thickened, infiltrated, and painful. There are a few exceptional conditions which simulate this involvement, such as septic ulcers, urethrocystitis after catheterization, puerperal fistulas, and degenerating malignant growths. The diagnosis of an acute gonorrheal urethritis can be readily made by an examination of the secretion, which contains pus cells and intracellular and extracellular gonococci. A purulent discharge from an inflamed urethra, especially if the external meatus is red and ectropic, is almost surely gonorrheal.

An acute urethral gonorrhea often causes very slight symptoms if limited to the anterior part of the urethra and heals better and much more quickly than in men. In three to four weeks the purulent secretion becomes milky and mucoid and contains many epithelia. Gonorrheal urethritis generally heals, and often without any treatment whatever. It is often healed in six to ten weeks and sometimes much earlier.

Chronic Gonorrheal Urethritis.—In chronic urethritis there are red spots and streaks in the lining. There is redness about the follicles. The lining consists of stratified squamous epithelium plus leukocytes. The subepithelial tissue contains dilated vessels and an infiltration consisting mostly of mononuclear leukocytes. There is small-celled infiltration. This infiltration is especially marked near the external opening of the urethra, *i. e.*, in the papillary excrescences or caruncles.

In the chronic form there is a thick layer of squamous epithelium, but the subepithelial infiltrate is superficial. Gonococci are no longer present in the subepithelial tissue, but are present in the

upper layers of the squamous epithelium or only in localized spots which look eroded.

Involvement of the Follicles of the Urethra.—There are many follicles in the urethra. The glands of the urethra are like those of the prostate. Infection of these glands is a severe complication, for it keeps up a chronic discharge of an infectious nature and may cause polyps. There may result a paraurethral abscess. In addition, there are the two glands of Skene, and the periurethral glands, which are four or more and situated in the wall of the urethra about its external opening. They often have a trumpet-shaped outlet. These should be examined before or after examining the urethra. Inflammation of the periurethral glands is acute or chronic. With recurrences, little abscesses may form. Inflammation of these periurethral glands constitutes the so-called urethritis externa—a very frequent condition.

Caruncles.—Proliferation from or about Skene's glands occurs with continued irritation and causes caruncles, which are polypoid, hyperemic growths in the anterior third of the urethra, originating from the inferior wall. They are covered with mucosa and protrude from the urethra. They consist of a loose, vascular, inflammatory infiltrate.

Chronic urethral gonorrhea may last for years. In chronic cases the speculum (Fig. 41) shows erosions, infected lacunæ, gray plaques surrounded by red areas, etc. The urethra feels hard and infiltrated and the secretion contains many degenerated epithelia. Infiltration in the chronic cases may be diffuse or circumscribed. In the diffuse form the wall of the urethra is diffusely indurated. There are elevated folds of infiltration of a yellowish color. The healing areas are covered with epithelium and take on a grayish look. In the circumscribed form there are infiltrations about the lacunæ and Littré's glands. The epithelium is easily injured in these areas. The infiltrations heal and form fine sclerotic bands, which finally take on a white color and may form minor strictures.

Chronic gonorrheal urethritis may show spots of redness around the external meatus. Through the vagina the urethra feels thickened, infiltrated, and sensitive. A secretion is generally obtained readily on milking the urethra, but sometimes this secretion can only be gained if a period of from three to five hours elapses since the last urination.

Mild Gonorrheal Urethritis.—Chronic cases often escape detection, for a secretion can be obtained by massaging the urethra only in the morning before urination or if the patient has not urinated for several hours. Often the secretion is minimal in amount, yet symptoms may persist. A frequent form of mild gonorrhea consists of either a chronic or a subacute urethral infection, with or without an infection of the cervix uteri. There may be a subacute infection of the urethra without involvement of the cervix and vice versa. Gonorrhea is found more frequently in the cervix than in the urethra in older cases, whether chronic after an acute attack or subacute from the beginning. (1) A gonorrheal urethritis often heals as quickly or quicker than in men. The prognosis of even an acute gonorrhea is good if it is located in the urethra, either with or without treatment. (2) The largest number of gonorrheal infections are non-acute. Infection is transmitted to women from male urethras and prostates which are supposedly healed or which give forth an unrecognized inflammatory secretion or which give forth a discharge which is considered innocuous. In such cases pus does not come in contact with the urethra during the act of copulation. The infecting elements are expelled with the seminal fluid and thus come in contact with the cervix alone. When such secretions do infect the urethra, the character of the infection is very mild.

Symptoms.—The symptoms of urethritis depend for their severity on the acuteness of the involvement, but more particularly on the location. If the anterior part of the urethra is affected, the patients experience only a slight burning or an itching, due to irritation of the external meatus and the vestibule. Involvement of the posterior half of the urethra in the form of a urethrocystitis may give symptoms of such severity as to simulate a cystitis. Among the symptoms of the latter form are frequency of urination, painful and uncomfortable desire for urination; micturition may be so frequent and painful as to deserve the name tenesmus. In some cases there may be ischuria, that is, a difficulty or impossibility of voiding urine or of emptying the bladder. The bladder has to be emptied several times daily with the catheter. In such cases attempts at urination may cause a flow of blood. In chronic cases there may be simply a frequency of urination, noticeable at

night as well as by day. The desire for urination occurs when there is very little urine in the bladder. In other instances the desire for urination at night is not so marked, but during the day, when the patient is in the erect position and the urine in the bladder touches the urethrocystic sphincter, frequency of urination is pronounced. In the milder chronic cases, especially in such as have a minimal amount of secretion, there is simply a tickling or burning on urination or a sensation of itching and a feeling of discomfort after voiding urine.

Diagnosis.—In acute cases the very existence of a purulent discharge from an inflamed, sensitive urethra, especially if the external meatus is red and ectropic, is almost absolute proof of gonorrhea. Examination of the secretion by microscope shows gonococci. In the acute cases of urethritis, or especially of urethrocystitis, the amount of pus in the remaining urine, after the first few drams are passed voluntarily, is small. In a cystitis, however, all the urine is cloudy and contains pus cells, epithelia, and blood, especially in the last few drams, whether passed voluntarily or withdrawn by the catheter.

In chronic cases a milky, thick, mucoid secretion can be obtained by massaging the urethra through the vagina. Pus cells and gonococci may be obtained by scraping the urethra with a dull spatula, but many such secretions, when examined, are found to contain numerous squamous epithelia of all sizes and varying numbers of pus cells. Gonococci are often absent or found with difficulty. Chronic gonorrheal urethritis may show spots of redness about the external meatus. Through the vagina the urethra feels thickened, infiltrated, and sensitive. A secretion is generally obtained readily on milking the urethra. In very old cases or in cases subacute from the beginning, whether the amount of discharge obtained is large or minimal, the microscope shows mainly squamous epithelium, very few pus cells, and absolutely no gonococci. The fewer the pus cells, the greater is the probability of the absence of surface erosions and the greater is the probability of involvement of the glands.

In diagnosing chronic or subacute urethritis the urethra should be massaged through the vagina from the internal toward the external meatus (Fig. 22). By massaging first the anterior half of the

urethra and then the posterior, we may know by the discharge obtained by each of these manipulations whether the anterior half or the posterior half or the whole urethra is involved. To determine whether involvement of the urethral glands is the cause of the chronic discharge the patient should void urine, or else the bladder should be injected with a solution directly through the urethra without the aid of a catheter. The latter procedure (after gentle massage of the urethra has been done) clears the surface secretion away. If, after so doing, the urethra is again massaged and more secretion is obtained, it comes in all probability from beneath the surface, that is, from the glands of the urethra. Such cases may show nothing but squamous epithelia under the microscope and gonococci are often not found.

In cases of chronic urethritis a sound introduced into the urethra shows the canal to be sensitive. Pain is caused by the sound and irregularities may be felt which, too, are very sensitive. The use of the sound aids in differentiating involvement of the urethra from an involvement of the bladder.

Treatment.—In the treatment of acute gonorrheal urethritis attention is to be paid to the diet, which should be mainly fluid. All irritating foods should be avoided. Alcohol in any form should be absolutely prohibited. Rest in bed hastens recovery to a considerable extent. Acute gonorrheal urethritis is to be treated by internal medication only. Urotropin is to be taken, 7 grains three to five times a day; salol, 5 grains, should be added. With this medication plenty of water should be taken, a glass of water being administered with each dose of these drugs. Helmitol, 15 grains, is sometimes better than urotropin.

Local treatment of the urethritis is to be begun only in the subacute stage. At this time balsam of copaiba, 15 grains in capsules, or oleum santali may be administered three times a day. Of the internal antigonorrheic remedies, arhovin is said to be free from the untoward effects of the balsams. Arhovin internally is indicated in inflammation of the urethra associated with pain on urination and cystitis. In the chronic form it is sometimes of great relief.

Arhovin is an aromatic fluid given internally in capsules. It causes acidity in alkaline urine, even in one undergoing ammoniacal fermentation. It is a sedative and anesthetic to mucosæ and does

not annoy the stomach. Six to twelve capsules, each containing 4 grains, are to be taken daily.

Gonosan is an oleaginous substance soluble in ether, alcohol, or chloroform. It is the active principle of kava-kava dissolved in sandal-wood oil. Gonosan contains 20 per cent. of kava and 80 per cent. of sandal-wood oil. Kava renders mucous membranes ischemic and anesthetic. The dose is one or two capsules four times a day after meals. It lessens secretion, checks the growth of gonococci, is a diuretic, and prevents pain.

Of the drugs to be used for the local treatment of the urethra I find that nitrate of silver and protargol are the two most valuable. In the earlier periods protargol, 1 per cent. or stronger, can be injected into the urethra with a pipet without much annoyance to the bladder, or else several ounces are injected by syringe directly into the bladder per urethram with the Frank syringe, and are then voided (Fig. 32). The patient should first urinate and then the urethra should be massaged to clear the ducts and crypts of secretion before treatment is begun.

When small amounts of the stronger solutions are to be injected, the eye-dropper pipet is sufficient, the bladder being protected by a preliminary filling with any mild solution (Figs. 30, 33).

Before applying silver nitrate it is better to first have the patient urinate and then to massage the urethra. Then inject into the bladder several ounces of $\frac{1}{8}$ to $\frac{1}{4}$ per cent. solution of protargol. After removing the catheter inject into the urethra with a large straight glass pipet with large rubber bulb, several tubefuls of 1 per cent. silver nitrate, moving the pipet so that half the quantity passes into the bladder while the other half will run out of the urethra. The protargol solution in the bladder should be then voided at the end of three to five minutes. In the later stages, if this method fails, 1 per cent. ichthargan or 5 per cent. nitrate of silver may be injected into the urethra every other day, the bladder being protected by a solution injected into it. This treatment of the urethra should be carried out three times a week.

Applications may be made to the urethral mucous membrane by the aid of cotton wrapped about thin wooden or metal applicators; or it may be accomplished by the aid of cotton wrapped about the tip of a Braun syringe, the fluid being injected to moisten

the cotton after introduction into the urethra (Figs. 53, 54). By gently withdrawing the tip of the syringe the cotton may be left in place for any desired time. By any of these methods we may apply stronger solutions.

Protargol works well when in contact with a mucous membrane for several minutes, and is therefore of value in cystitis, while the silver nitrate solutions act quickly and therefore work better in the urethra. If, however, protargol is desired, it may be applied with the aid of cotton wrapped on applicators or on the Braun syringe and left in place five to ten minutes.

With the Frank syringe the urethra may be irrigated directly into the bladder without the aid of a catheter. Various solutions may be used, such as 1 per cent. ichthyol, 1 to 5 per cent. protargol, ½ per cent. albargin, 5 per cent. argyrol, etc.

The same procedure may be carried out in milder cases or as a preliminary to local applications by using a solution composed of 1 dram of a combination of zinc sulphate, boric acid, and alum to the pint of water.

In the treatment of urethritis the order as given below is followed. One may begin with protargol or largin of a strength of 1 to 2 per cent.; subsequently argentamin, ichthargan, or nitrate of silver is used in a solution of 1 : 1000 up. Finally, the simple astringents are applied, if necessary.

In chronic cases it may be necessary to introduce into the urethra sticks of cacao-butter containing protargol; or sticks containing iodoform or ichthyol may also be used. A method which is sometimes of value in the chronic form when the follicles are infected and when erosions are present is the injection into the urethra with a pipet of boroglycerin every other day. If this treatment is applied for six to twelve days, the subsequent application of silver sometimes cures a previously resisting case. In the still more stubborn cases due to stricture, to erosions, to involved follicles, 20 to 50 per cent. silver must be applied locally with the aid of the small speculum (Fig. 41) or else the actual cautery must be used.

It is sometimes necessary to dilate the urethra if it is infiltrated. Stricture of the urethra does not occur until the chronic stage, and it may be treated by gradual repeated dilatations, preferably with the Hegar dilators. The urethra is then painted with tincture

of iodin or 5 to 20 per cent. cupric sulphate or 5 to 20 per cent. silver with the aid of applicators. In continued involvement of the glands of Skene it is necessary to slit them up for their entire length and to cauterize them (see page 57).

In the treatment of urethritis drugs are used in the following order: (1) Such as are purely antiseptic and not astringent; (2) antiseptic astringents; (3) astringents.

An ideal silver salt should (1) not coagulate albumin, (2) should not precipitate sodium chlorid, (3) be soluble in water, (4) cause no pain, (5) cause no irritation. These purposes are fulfilled by the newer silver preparations.

Among the antiseptic but not astringent silver salts used in urethritis are the following: protargol (8 per cent. silver), used in the strength of ¼ to 5 per cent.; largin (11 per cent. silver), ½ to 2 per cent., a stronger antiseptic than protargol; argonin (6 per cent. silver), used in ½ to 5 per cent. solution; albargin (15 per cent. silver), used in the strength of 1 : 1000 to 1 : 100; argyrol, 2 to 20 per cent. solution.

Among the antiseptic astringents which are ordinarily used to diminish hyperemia and hypersecretion in urethritis, which are germicidal but which cause slight irritation, are: nitrate of silver, 1 : 1000 to 1 : 100; argentamin, 1 : 1000 to 1 : 100; ichthargan (30 per cent. silver combined with ichthyol), 1 : 1000 to 1 : 500, is said to penetrate deeper than silver nitrate; ichthyol, 1 : 500 to 1 : 100.

Among the astringents which are used to diminish hyperemia and hypersecretion are: zinc sulphate, 1 : 500 to 1 : 100; acetate of lead, 1 : 100 to 1 : 50.

Urethral suppositories, called bougies, pencils, or bacilli, consist of a base of glycerin, gelatin, or cacao-butter.

The glycerin suppositories consist of a base of 95 per cent. glycerin and 5 per cent. stearic acid. The gelatin ones are made of boroglycerid and gelatin. These two latter forms require a special machine for their manufacture, and are made containing various drugs by large drug firms. Any druggist can make the suppositories with the base of cacao-butter. Although glycerin is of value, the cacao-butter base suffices in most instances. A suppository for the urethra 2 inches long and ⅛ of an inch in

diameter contains about 8 grains of cacao-butter; one 2½ inches long and ¼ of an inch thick contains about 20 grains of cacao-butter. On this basis they may be made to contain various percentages of the various drugs. To obtain a suppository containing 1 per cent. of the desired medicament in a suppository 2 inches long and ⅛ of an inch in diameter:

℞. Iodoform..... gr. 1/12
Or—
Protargol..... gr. 1/12
Or—
Arg. nitr..... gr. 1/12
Or—
Ichthargan..... gr. 1/12
Or—
Zinci sulph..... gr. 1/12
Butyr. cacao..... gr. viij
F. tal. suppositoria urethral. (2½ inches long, ⅛ inch thick) no. x.

To order a suppository 2½ inches long and ¼ of an inch thick which contains 1 per cent. of the following drugs:

℞. Iodoform..... gr. ½
Or—
Protargol..... gr. ½
Or—
Arg. nitr..... gr. ½
Or—
Ichthargan..... gr. ½
Or—
Zinci sulph..... gr. ½
Butyr. cacao..... gr. xx
F. tal. suppositoria (2½ inches long, ¼ inch thick) no. x.

Increasing the percentage of the drug in any of these suppositories is rendered easy by simply making any desired multiple of the amount noted in the above forms.

The following represents *Finger's treatment* of gonorrheal urethritis: For gonorrheal urethritis use injections of 1 per cent. protargol sent directly through the urethra into the bladder. In the later stages the same thing may be done with 1 : 1000 argentamin or silver nitrate. By some, acute urethritis is treated by irrigations of the urethra with 4 per cent. gallobromol in large amounts. Gallobromol is a combination of gallic acid with bromin. For subacute and chronic urethritis the urethra is painted with 20 per cent. gallobromol solution, or 50 per cent. gallobromol sticks are introduced into the urethra. In acute cases gonosan and oleum

santali are given, and if the bladder is involved, sodium salicylate and salol are used.

In subacute cases the urethra may be treated by the introduction of iodoform sticks, or be painted with tincture of iodin or 2 to 5 per cent. silver nitrate with the aid of a short endoscope.

If there is marked infiltration of the external opening of the urethra or of the entire urethra, gradual dilatation with metal sounds should be practised, followed immediately by irrigations or painting of the urethra.

Folliculitis about the external opening of the urethra is cured only by destruction of the follicles with the silver stick or with the cautery.

GONORRHEAL CYSTITIS

Frequent as is the occurrence of a gonorrheal urethritis in the female, extension of the inflammation to the bladder was referred, for a long time, to a complicating cystitis produced by other bacteria or to involvement by the gonococci of the neck of the bladder alone. In recent years many instances of purely gonorrheal cystitis have been definitely diagnosed, so that its entity is positive.

Histopathology.—In the early days Barlow was one of the first to find, in two cases of cystitis, only gonococci in the urine. The cystoscope showed diffuse inflammation of the entire bladder mucosa. Krogius, in two cases of purulent cystitis, found numerous gonococci in the epithelial cells in the urine. Wertheim, Bierhoff, and others have verified this condition many times. It is a fact, however, that gonorrheal cystitis is not so frequent, and most of the cases which have the subjective symptoms of gonorrheal involvement of the bladder are really cases of posterior urethritis or urethrocystitis.

How deeply the bladder mucosa may be involved, however, is shown by a study of a case of purulent cystitis in a nine-year-old child, in which Wertheim found only gonococci. In narcosis a piece of the bladder mucosa was removed with the aid of the cystoscope. Gonococci were obtained in the cultures from the excised specimen. The microscopic examination of the specimen showed: (1) Gonococci between the epithelial cells; (2) gonococci extending in rows into the subepithelial connective tissue and

lying almost entirely extracellular; (3) the surface of the mucosa covered with fibrin layers; (4) gonococci in the blood-vessels. The gonococci were not always of typical form, but were rather involution forms and groups looking like masses of granules.

Symptoms.—The symptoms are those of a very acute cystitis. The urine of a gonorrheal cystitis is purulent and contains pus, epithelia, and sometimes red blood-cells or blood. In the acute cases the last few drops obtained on emptying the bladder by catheter contain very much pus, epithelia, and blood. The urine has no odor of ammoniacal degeneration. The standing urine forms a sediment of pus, and examination by the microscope shows gonococci. In the chronic cases pus is obtained by the centrifuge and can be detected by the microscope. The first urine passed, which washes out the urethra, should be excluded. In some cases the urine is so slightly purulent that the cystoscope is essential to the making of a diagnosis of involvement of the bladder.

Treatment.—Acute gonorrheal cystitis should be treated by the internal administration of salicylate of soda or salol, 5 grains every three hours. The use of salol results in the liberation of carbolic acid and salicylic acid in the urine. Urotropin is a very valuable urinary antiseptic as an adjunct to salol in doses of 7 grains every three hours. It is of great importance in the chronic form. Helmitol, 7 to 10 grains three times a day, gives off more formaldehyd in the urine than does urotropin. Saliformin, 5 grains every four hours, is a valuable urinary antiseptic. A valuable combination consists of sodium salicylate, 1 dram; urotropin, 1½ drams; tincture of hyoscyamus, 4 drams; elixir simplex, q. s. ad 4 ounces; 1 dram of this mixture being given in water several times a day. Benzoic acid, 10 grains three times a day in capsules, is a local alterative and antiseptic. It acts well in gonorrhea, and expecially well in ammoniacal cystitis. Methyl-blue, 5 grains several times a day in capsules, is only mildly antiseptic and is of aid in the non-gonorrheal forms.

℞. Urotropin ..... gr. vij
D. tal. tabel. no. xv.
S.—One t. i. d. with water.

℞. Sodii salicylatis..... ℥iij
Div. in dos. no. xii.
S.—One powder t. i. d. with water.

℞. Ext. hyoscyam..... gr. ss
Salol..... gr. v
Urotropin..... gr. v
F. tal. caps. no. xx.
S.—One every three hours with water.

The pain associated with cystitis in the acute stage may be relieved by a suppository containing 1 grain of extract of opium, 1 grain of extract of hyoscyamus in oil of theobroma. If this does not relieve the pain and spasm, morphin must be given by the needle. The fluidextract of uva ursi, 1 dram three times a day, is a slight stimulant and astringent and is of value in the early stages. The fluidextract of kava-kava, ℥ss three times a day, is highly comforting, especially in gonorrheal cystitis. Balsam of copaiba, 15 grains in capsules, is a local stimulant to the mucous membrane. Among the other drugs taken internally are the alkalies, which should be given only if the urine is very acid. They are of value in acid cystitis which is not gonorrheal and in cases of irritable bladder associated with acid urine.

℞. Ext. opii..... gr. j
Ext. hyoscyam..... gr. j
Ol. theobrom., q. s.
F. tal. supposit. rectal. no. v.
S.—One when necessary.

℞. Infus. fol. uvæ ursi..... ℥xv
Syr. papaveris..... ℥iv
S.—One tablespoon every two hours.

The local treatment of acute cystitis is carried out by irrigation. A preliminary washing of the bladder is of value to remove pus and bacteria. Normal salt solution, 2 drams to the quart, or mild boracic solution, 1 per cent., is used for the preliminary washing, either of which fluids have a non-irritating influence on the mucous membrane.

The preliminary irrigation should be followed by irrigation with fluids which have a destructive action on the bacteria and which exert a stimulative influence on the epithelium and so aid in the throwing off of bacteria. Protargol, while not quite so valuable in this respect as silver, is much less irritating and should be used in the acute stages. Protargol works well even in weak solutions of 1 : 800 up to 1 : 500 in the acute stages, and from 1 to 5 per cent. in the more stubborn cases. Several ounces are to be injected

into the bladder and allowed to remain for five to ten minutes. If the bladder is extremely sensitive, it should be first anesthetized by injecting into the bladder an ounce of a 1 per cent. solution of eucain or of a 4 per cent. solution of antipyrin. In place of protargol, the bladder may be irrigated by ¼ to ½ per cent. watery solution of ichthyol, which should be left in place for several minutes (Fig. 33).

In the subacute stage or in stubborn cases nitrate of silver diminishes congestion and stimulates regeneration, and is, in addition, a very valuable germicide. When used in solution of 1 : 10,000 and gradually increased to 1 : 500, and in very stubborn cases even to 1 : 100, it renders the urine clear. If too annoying, it should be preceded by the use of an anesthetizing solution. The strength of any of the irrigations depends upon the sensitiveness of the bladder, which can be judged by the preliminary washing with saline or boracic solution and by the amount which the bladder can hold when this preliminary solution is injected.

Milder forms of cystitis may be treated by irrigations with ½ per cent. salicylic solution or by 2 per cent. resorcin solution, which are mildly germicidal. Permanganate of potash is an antiseptic of value and may be used in the strength of 1 : 10,000 to 1 : 2000.

In chronic cystitis nitrate of silver 1 : 3000 or 1 : 500 should be used every other day. The stronger solutions must be preceded by the anesthetizing instillation.

Finger's method is as follows: In the acute cases of urethrocystitis and cystitis Finger advises a symptomatic and expectant treatment. Regulation of a hygienic, dietetic character is often enough to cause a rapid cure of the condition. Of prime importance is rest in bed. As fluids he prescribes thick decoctions; among them is: Decoctio fol. uvæ ursi, 500; syr. papaveris, 15; one tablespoon every two hours.

If there is hematuria, he administers styptics, among which he includes solutio ferri sesquichlorati.

℞. Liq. ferri sesquichl. ..... gtt. xv
Syrup. aurant. cort. ..... ℥vj
Aq. destillat. ..... ℥vj
S.—One tablespoon every hour.

In stubborn cases of hematuria he injects 2 to 3 c.c. of a 1 : 1000 adrenalin solution into the bladder with very good results.

Pain is treated by extract of belladonna and morphin in suppositories or by subcutaneous injections of morphin. He also advises warm moist applications to the abdomen.

When the irritating symptoms have disappeared and the objective symptoms still remain, he makes use of internal treatment and of irrigation. Internally he used oleum santali, gonosan, balsam of copaiba, which rapidly clear the urine. If these do not produce good results, he makes use of a combination of extract of cannabis indica and extract of hyoscyamus, or of benzoic acid, or sodium salicylate or salicylic acid, and also urotropin.

℞. Acidi benzoici ..... ℥j
Syrup. cort. aurant..... ℥v
Aq. destillat. ..... ℥viij
S.—One tablespoon every two hours.

℞. Caps. gonosan no. xx.
S.—One t. i. d.; or
S.—Two t. i. d.

℞. Ol. santali..... gtt. x
Disp. tal. dos. no. xx.
S.—One capsule t. i. d.

℞. Ext. cannab. ind..... gr. iij
Ext. hyoscyam..... gr. v
Sacch. lactis..... ℥iss
M. f. pulv. Div. in dos. xij.
S.—Three to five powders daily.

Care is necessary in the use of alkaline waters. In the mucous catarrhal form with acid urine, he uses with good effect the waters of Giesshuebl and Wildungen.

If the urine is only slightly acid, or alkaline, and if there is a tendency to phosphaturia, these waters are contraindicated, since they increase the alkalinity of the urine, increase the phosphaturia, whereas it should be our duty to keep the urine acid, to make it acid if alkaline, for which purpose the balsams, sodium salicylate, benzoic acid, and especially salicylic acid are best.

If the urine still remains cloudy and if it contains mucus and pus, local therapy is indicated. The bladder is irrigated by injecting 80 to 100 c.c. of sterile water into it and letting the fluid run out through the rubber catheter. This is repeated two or three times. Then various solutions may be injected into the bladder and left in place for three to five minutes or longer. The watery solutions

to use are salicylic acid ½ per cent., resorcin 3 to 5 per cent., protargol ½ to 1 per cent., permanganate of potash 1 : 2000, boracic acid 3 : 200, nitrate of silver 1 : 1000 to 1 : 500, largin ½ to 1 per cent.

In chronic cystitis, in addition to local and internal treatment, a cure is often obtained only through a general tonic régime.

GONORRHEAL VULVITIS

Diffuse structural involvement of the vulva of adults by the gonococcus is rare. The vulva is often irritated by the gonorrheal discharge coming from the higher areas of the genital tract or from the urethra. The vulva is red and is eroded in spots which are covered with pus. The small labia and clitoris may be edematous. The labia are swollen, red, eroded, and covered with pus and crusts. The vestibule is red and swollen and shows very red spots. The ring of the hymen is swollen and red and pus is collected in all the recesses and in the fossa navicularis. The openings of the ducts of Bartholin are red. In all the folds we find eroded spots and membranes.

Acute gonorrheal vulvitis in adults is rare. The symptoms are burning, itching, and pain. The flow of urine increases the annoyance. There is much secretion. There is heat and burning in the vulva. Walking is painful through rubbing together of the affected parts. The inguinal glands are swollen and sensitive. The parts are sensitive to touch and examination. This condition improves readily, and in ten days to two weeks the eroded areas are cleared up and evidences of inflammation are almost gone. Acute vulvitis is of various degrees of virulence and the above annoyances may be relatively slight.

There are numerous small glands in the vulva situated about the urethra, in front of the hymen, and in the fossa navicularis, which, when infected, may form small purulent nodules. Small abscesses may result. They may be of the appearance of small furuncles, really forming a gonorrheal furunculosis. In the acute cases we see red spots from which a purulent or mucoid secretion may be pressed out.

In a chronic vulvitis the glands in the vestibule, the glands of

Bartholin, and the glands about the external opening of the urethra are involved and secrete pus or mucopus. The fourchet is eroded. Gonorrheal vulvitis in adults is secondary to gonorrhea of the cervix and uterus. Vulvitis without purulent urethritis and without purulent cervical or uterine discharge is probably not gonorrheal. In chronic vulvitis we must exclude vulvitis due to masturbation, vulvitis due to uncleanliness and to other bacteria, as well as vulvar changes due to syphilis, etc.

Treatment of Chronic Vulvitis.—Acute gonorrheal vulvitis should be treated by cleansing of the external structures. Mild solutions of corrosive sublimate, 1 : 5000 to 1 : 10,000, should be used. The parts should be carefully separated and gently sponged with cotton soaked in this solution. Bichlorid gauze should then be placed in such a manner that the two sides of the vulva are kept apart. A moderately tight T binder should be applied. The vulva should be washed in this manner several times daily, each washing being preceded by a vaginal douche of bichlorid of mercury, 1 : 2000. The patient should be kept in bed, laxatives should be administered, and urotopin and salol, 5 grains of each, should be administered four times a day. If the skin is sensitive and red and is irritated by the action of the bichlorid of mercury, the gauze dressing should be saturated with a solution of acetate of aluminum. In the subacute stage the vulva is to be treated by the silver salts. It should be painted with argyrol 25 per cent., or with nitrate of silver 10 per cent., and the surfaces should be kept dry by gauze dusted with dermatol and nosophen.

The successful treatment of chronic vulvitis is sometimes difficult. Infiltrated, swollen, and suppurating follicles must be painted with silver solution, 10 to 20 per cent. The best treatment is to destroy the follicles or plaques with the actual cautery.

BARTHOLINITIS

Infection of either of the two vulvovaginal glands of Bartholin by the gonococci may occur as early as fourteen days after the primary infection, but it generally occurs weeks or months or even years afterward. It is especially frequent among puellæ publicæ. The duct of the gland is red and swollen. The gland itself may be

scarcely felt. Pressure on the posterior part of the large labium forces pus out of the gland. The patient is sensitive to pressure and there is some pain on walking or sitting. Closure of the duct causes a spindle-shaped or round swelling the size of a hazelnut. If the retained purulent secretion is much in amount, we get a pseudo-abscess the size of a pigeon's egg or larger.

Abscess of the Gland.—In the acute form, which is practically always due to gonorrhea, there is an acute swelling of the whole gland. Secretion finds no outlet through the swollen duct and purulent contents are accumulated. The surrounding tissue becomes infiltrated and there is seen in the lower third of the large labium a swelling the size of a small egg, which projects toward the introitus and pushes the other labium to the other side. Its surface is red and swollen. The whole area is markedly sensitive; there is pain and a sensation of burning and irritation. If the surface at any part becomes thinned out, the abscess may break spontaneously on the outer surface of the labium, or more rarely may break into the rectum.

An acute non-gonorrheal infection of the Bartholinian glands is rare. The purulent gonorrheal form is considered to be a mixed infection and results as follows: The duct is inflamed and in it there is a subepithelial infiltrate. The lumen is filled with cell detritus, with squamous epithelia, and gonococci. The duct is easily obstructed, pus accumulates, and a pseudo-abscess results. If a mixed infection takes place when the gland becomes affected, there are found, in addition to gonococci, staphylococci and streptococci. If the pus is fetid, it is due to anaërobic bacteria.

In chronic cases the outlet of the duct is red, flea-bite in appearance, forming the so-called maculæ gonorrhœicæ. There is a secretion of mucopurulent or mucoid character.

Chronic Bartholinitis.—A chronic Bartholinitis often represents the only spot on the external genitalia which is affected in chronic gonorrhea. If there is an accumulation of secretion, a nodule is present. If not, there are only red flea-bite spots about the openings of the ducts.

Subacute Bartholinitis.—In subacute involvement there is only slight redness and swelling and no pus accumulation is retained in the gland. The duct is involved by a catarrhal inflammation.

Here also the opening of the duct is red, forming the so-called maculæ gonorrhœicæ. If the outlet through the duct is obstructed, a cyst may be formed. In chronic cases the gradual accumulation of secretion (in which cocci are absent) and without inflammatory symptoms may form a cyst of the gland.

Cyst of the Gland of Bartholin.—Cyst of the gland of Bartholin is not necessarily gonorrheal, according to general opinion. However, the view of Veit and others, with which I agree, is that a gonorrheal infection, perhaps dating back to the years of childhood, has produced a cyst in the clear secretion of which inflammatory evidences are entirely gone.

Treatment.—In the early stages of a Bartholinitis rest and cold applications are indicated. As soon as an abscess forms it must be treated by incision, irrigation with corrosive sublimate, and packing with iodoform gauze (see page 58). In the chronic cases excision must be practised.

In chronic Bartholinitis the glands must be treated by irrigations and injections if the duct is large enough. If the duct is not large enough, a hypodermic injection must be made into the glands directly and a few drops of a 1 to 2 per cent. silver solution should be introduced. In this way the involved gland or cyst may be brought by an active reaction to obliteration. The best treatment is to remove the gland or cyst surgically.

GONORRHEA OF THE ANUS AND RECTUM

Baer found that in one hundred and ninety-one cases of gonorrhea there was rectal involvement in 30 per cent. It is due to the outflow of secretion. There is a sensation of heat and burning in the anus which is increased on defecation. Erosions, ulcers, and especially fissures of the anus are present and sometimes blood is passed. A secretion is generally obtained after manipulation or on the use of the rectal speculum, and shows gonococci. On examination with a speculum the rectal mucosa looks red and edematous and may show ulcerations, as a result of which infiltrations take place. This condition is frequently overlooked. Many women suffering from fissures of the anus and from inflamed "hemorrhoids" are really suffering from gonorrheal involvement of the

anus and rectum. I have found this to be the case in many instances where no other symptoms were complained of. Further examination shows an unrecognized cervico-uterine gonorrhea.

Treatment.—For the treatment of rectal gonorrhea the rectum should be irrigated three times a day with any of the following solutions, after first cleansing with a normal saline enema: 1 to 5 per cent. protargol; $\frac{1}{8}$ per cent. albargin; 1 : 4000 argentamin; 1 : 5000 potash hypermanganate.

With the aid of a rectal speculum the various silver salts may be directly applied in stronger concentration. Old stubborn cases demand the use of the Paquelin applied to fissures and ulcerations.

GONORRHEAL VAGINITIS

In chronic gonorrhea in the female the vagina may seem normal, but in acute cases we may have an involvement of the vagina which is secondary and is due to the continued discharge of gonococcus-bearing secretion from the cervix and uterus. The vagina is then red and swollen and there is a purulent secretion, especially in younger persons.

Histopathology.—In children the cocci readily enter the vaginal epithelium. When the gonococci enter the vaginal mucosa the changes are: (1) The surface epithelium is gone; (2) all the epithelium is gone in spots; (3) gonococci enter into the epithelium in certain areas in bands; (4) the gonococci may enter very deeply into the tissue in spots and may extend beyond the epithelial limit. Though the gonococci are generally in the superficial connective tissue, yet in certain areas they may become deeply embedded.

Ghon and Schlagenhaufer have found that the subepithelial connective tissue shows small-celled infiltration. Papillæ with dilated vessels project above the surface and the epithelium of these papillæ is only of one or two layers. There are many polynuclear leukocytes in the infiltrate. In the posterior fornix the epithelium is loosened and infiltrated with polynuclear leukocytes. Papillæ infiltrated and rich in vessels project like small polyps and their epithelial covering is of one layer or is gone. The change is most intense in the region of the external os. Here the epithelium is gone and numerous papillæ project above the

surface. Mononuclear and polynuclear leukocytes cover the surface.

Symptoms.—When the vagina is affected by gonorrhea, it is very red and bleeds easily. There are many eroded areas covered by a membrane composed of fibrin, pus cells, epithelium, and gonococci. There is especially much membrane in the posterior fornix. The vagina is very sensitive on examination, there is a sensation of heat and burning in the vulva, the patient can scarcely walk. Pressure on the abdomen causes pain, and coughing, or even talking may be painful. There is elevation of temperature. There is a feeling of weight and burning in the genitalia. There is purulent discharge. Pain extends into the pelvis and is increased by defecation and activity. There is slight fever. Vulvitis and intertrigo and eczema are added. The introitus vaginæ is swollen and red and eroded spots are noted. Sometimes the vagina is so sensitive that even most careful examination causes vaginismus.

After the acute stage is over, in some cases the vaginal folds are infiltrated and covered with small red granules, the so-called vaginitis granularis. The acute stage lasts eight to ten days. Gonorrheal vaginitis is generally healed in three or four weeks. Recrudescences occur, especially after menstruation.

Bumm says it heals in three to four weeks. The pus cells become fewer, more epithelia appear, and the discharge becomes white and granular. Light recrudescences may occur at menstruation. Bumm denies the existence of chronic vaginal gonorrhea. He says that vaginitis granulosa, which is generally considered a form of chronic gonorrhea, is not due to this etiology. He says that cocci cannot be found in most of these cases and that when the secretion is inoculated on sensitive mucous membranes, negative results are obtained.

Gonococci are hard to find in the vaginal secretion because of the other cocci present. Irrigation of the vagina with silver solution causes cell desquamation. If then the vagina is scraped with a spatula or curet, we may find gonococci.

Secondary Gonorrheal Vaginitis.—Gonorrheal vaginitis is usually secondary and due to the irritation produced by cocci sent out from the cervix and uterus. Rarely do the cocci invade

the wall and multiply. Gonococci, however, may develop in the vagina, in the squamous epithelium, but as a rule they do not go deep. It has been shown that individual characteristics and not alone the squamous character of the epithelium play an important rôle. The vaginal epithelium in younger women, in gravidæ, in women with tender skin, lends itself more readily to gonorrheal vaginitis because of the succulence of the mucosa and the thinness of the epithelial layer.

Primary Gonorrheal Vaginitis.—Primary gonorrheal vaginitis does occur; it has been noted even after total hysterectomy. The vagina is hot, shiny, red, swollen, and bleeds easily. It is covered with pus or fibrin, under which are red, eroded areas.

In chronic vaginitis the mucosa is thickened, the folds are prominent and covered with granulation spots. There is erosion of the cervix or else eroded or swollen mucosa is found in the posterior fornix. Sometimes as the end-result of a vaginitis chronica we get a condition resembling psoriasis, characterized by a thick, hard, dry, white mucosa.

Treatment.—In acute localized vaginitis the patient should have rest in bed, the external genitalia should be thoroughly cleansed, cool or tepid sitz-baths may be taken daily. Alternate douches of bichlorid of mercury, 1 : 2000, and acetate of aluminum, 1 dram to 2 quarts of water, should be given four times daily and gauze soaked in 1 : 5000 bichlorid or in 1 per cent. acetate of aluminum should be applied to the perineum and vulva. Internally bromids and opium may be administered. When the primary inflammation and sensitiveness are diminished douches of bichlorid of mercury or ½ per cent. carbolic acid are of value. If the vagina is not too sensitive, it should be washed, with the aid of a Ferguson speculum, with sponges soaked in a carbolic solution, and gauze soaked in 1 to 5 per cent. protargol should be introduced into the vagina and left in place for several hours. Still later the vagina must be bathed, with the aid of a Ferguson speculum, by solutions of nitrate of silver 1 to 5 per cent., and the vagina should be gently packed with sterile gauze or iodoform gauze left in place for twenty-four hours. Then irrigate daily with alum 2 per cent. or permanganate of potash 1 : 1000. In the chronic persisting forms of vaginitis the Ferguson

speculum should be used and nitrate of silver should be thoroughly applied in very strong solutions (Figs. 38, 40).

In very chronic cases if silver 1 per cent. or stronger fails, paint the vagina every two to three days with tincture of iodin or silver 5 to 10 per cent. and pack the vagina with iodoform gauze for twenty-four hours. Continue the treatment till the vaginal epithelium desquamates. Douches should then consist of tannic acid, sulphate of zinc, or alum, 1 dram to the quart. Splendid results are to be had by bathing the vagina, with the aid of the Ferguson speculum, with corrosive sublimate 1:100 rendered acid by adding a few drops of hydrochloric acid. Then pack with iodoform gauze for twenty-four hours and repeat twice a week. In the mean time irrigate with 1:5000 to 1:2000 bichlorid. In that chronic form known as colpitis granulosa, first clean the vagina with the aid of the Ferguson speculum, and then use pyroligneous acid in the Ferguson speculum, rubbing it well into the vaginal mucosa with cotton sponges. This should be done two or three times a week. Between treatments astringent douches are taken.

The following represents Finger's treatment of gonorrheal vaginitis:

Acute vaginitis is often overcome by the use of cleansing douches, but the subacute and chronic forms are often stubborn.

In the early acute stages we make use of rest in bed, care of the bowels, cool sitz-baths, and cold applications to the genitalia and the perineum. Diet should be mild and non-irritating. Bromids, chloral hydrate, and morphin control the nervous symptoms.

So soon as instruments can be introduced into the vagina the vaginal mucosa should be cleansed by tampons with the aid of the Ferguson speculum. The vaginal wall is then washed or bathed with largin or protargol 3 to 5 per cent. or 1 to 2 per cent. permanganate of potash.

When the subacute stage is reached, and especially in treating vaginitis granulosa, there is used, in addition to the permanganate of potash, every second or third day, 1 per cent. silver solution for bathing the vagina. After each vaginal bath a tampon or gauze soaked in 5 per cent. largin glycerin solution should be introduced into the vagina.

This method of treatment should be carried out twice a day.

If the treatment, however, must be carried out by the patient, douches must be used consisting of 2 to 5 per cent. largin, 1 per cent. permanganate of potash, 1 per cent. sulphate of zinc, 2 per cent. alum, 5 per cent. ichthyol, or 2 per cent. argonin. Such douches should be taken three times a day and consist of two quarts. In such cases as must treat themselves with douches, every third day a vaginal bath should be given with 1 per cent. silver or tincture of iodin.

In the treatment of stubborn subacute vaginitis the vagina must be bathed daily with the above-mentioned drugs and the vagina must be tamponed. This treatment is continued for several successive days until the mucosa begins to be cast off. Then bathing is stopped and the above-mentioned irrigations are used daily until regeneration of the mucosa takes place. If then a normal mucosa does not result, the same treatment must be attempted over again. Schwarz recommends the following method: The vulva and vagina are cleansed with 1 : 1000 corrosive sublimate, then the vagina is energetically washed and rubbed with 1 per cent. corrosive sublimate with the aid of the Ferguson speculum, and the vagina is tamponed with iodoform gauze. This process is repeated in three days, and three days later the tampon is removed, and for the next two weeks douches of 1 : 2000 corrosive sublimate are taken twice daily.

Sänger makes use of corrosive sublimate. In order to aid the action of the corrosive sublimate, he introduces into the vagina a tampon soaked in tannic glycerin. The next day the vagina is cleansed with soap and water, and then with the aid of a Ferguson speculum is thoroughly bathed with corrosive sublimate 1 : 500 to 1 : 1000. Then a tampon soaked in iodoform-glycerin is introduced. In stubborn cases the vagina is also painted with tincture of iodin.

In the treatment of cervicitis Finger, when the acute stage is over, paints with the aid of a Playfair sound with 5 to 10 per cent. solution of protargol, and later with strong silver nitrate or tincture of iodin. Erosions of the vaginal portion heal rapidly with this treatment and healing is aided by occasional painting with 5 per cent. acidum trichloraceticum.

CERVICO-UTERINE GONORRHEA

In acute infections of the cervix the gonococci pass between the epithelial cells down to the connective tissue of the mucosa. There is a great infiltration with leukocytes, which wander up to the surface through the epithelium. In isolated areas the epithelium is gone or replaced by a layer of flat or round cells. In other areas there is a beginning formation of squamous cells. Nowhere does the process seem to extend markedly into the gland lumina.

In acute cervical gonorrhea the portio, when seen through the speculum, looks swollen, and its covering appears shiny and red. The cervical mucosa projects as two dark-red, lip-like protrusions. There is a discharge of greenish-yellow pus. The posterior fornix of the vagina is often red. Follicles of the portio may be purulent. Marked subjective symptoms are generally absent. Patients complain only of the discharge and of burning in the vulva. There is some feeling of weight in the pelvis and dull pains in the back. Gonococci are found by microscope.

In acute gonorrhea the cervix is red and swollen. There is eversion and protrusion of the mucosa. The mucosa bleeds easily. There may be erosions or ectropion. Later the secretion is milky, mucoid in character, or only cloudy mucoid. Even in a clear mucoid discharge gonococci may be found.

Acute gonorrheal endometritis represents an acute interstitial inflammation with small-celled infiltration. In acute gonorrhea of the uterus the cervix looks swollen, shiny, and red. If uterine involvement occurs after the cervix infection is better, the latter often lights up again. Pressure in the fornix, on the portio, and bimanual examination cause pain. The symptoms are weight in the pelvis, discharge, sensitiveness to jars, pain in the pelvis and back, constant discomfort in any position, a sensation of pulsation, and often temperature. The sooner after the cervix infection the uterine infection occurs, the worse are the symptoms. They are less if the infection extends gradually into the uterus or if it passes into the uterus after the cocci have become less virulent and then wake up after labor, or abortion, or curetting. Attacks limited to the uterine mucosa may subside quickly and the acute symptoms disappear.

Acute metritis comes from acute infection. It is an active process. There are chills, fever, dull pain in the pelvis. The patient seeks her bed. Often the tubes, ovaries, and peritoneum are affected, with or without the production of exudates. Chronic metritis may result from such an acute metritis or it may be subacute from the beginning. This is especially so in young married women infected from a supposedly cured gonorrhea by cocci of diminished activity. There is then a gradual onset of pain in the back and pelvis, especially at menstruation. There is cervical erosion or ectropion of the cervical mucosa. Exacerbations occur with abortion and labor. Acute metritis demands rest in bed for weeks.

Point of Location in Acute Gonorrhea.—In acute cases of gonorrhea, according to Bumm, the urethra is affected in 90 per cent.; the cervix in 40 per cent.; the glands of Bartholin in 12 per cent. In one hundred patients of Bumm's, however, in whom the cervico-uterine infection was at least five months old, only six had just a chronic urethritis with gonococci; thirty-seven had gonococci in the cervix and urethra; fifty-seven had gonococci in the cervix alone. Of the ninety-four cases whose cervico-uterine secretion contained gonococci, fifty-one had symptoms which indicated an infection of the uterine mucosa and forty-three had a more or less clear pelvic peritonitis with disease of the adnexa. The proportion in these hundred cases is not a criterion in general, for many patients with a fresh but non-virulent infection of the urethra or cervix do not consult a physician. Of seventy-four other cases observed by Bumm from the very beginning, for periods of five months to a year or more, 97 per cent. had urethritis, 70 per cent. had an affection of the cervix, 23 per cent. an involvement of the corpus of the uterus, and 10 per cent. tubal disease. It must be remembered, however, that tubal involvement often comes on months or years later and is of milder form.

Chronic Gonorrhea.—Bumm says that in chronic cervical gonorrhea the glands of the cervix are not affected. He examined five uteri, the seat of chronic gonorrhea, which were removed by hysterectomy for salpingitis. He found that in chronic cervical gonorrhea the glands are intact and that the epithelium is almost normal. Cocci are present only where the epithelium is gone, and at these points there is a great round-celled infiltration under

the epithelium. The cocci do not extend into the connective tissue. Round-celled infiltration is observed wherever cocci are present, and superficially at these points there is a coating consisting of pus cells and coagulum. Gonococci are found in the metaplastic epithelium, but the epithelium of the glands is immune, just as Bumm claims is the case with the glands of Bartholin. Chronic cervical gonorrhea represents, therefore, an invasion limited to certain small areas. Gonococci are found in the metaplastic epithelium and thence mix with the secretion. The regenerated cylindric epithelia seem to be immune to the cocci. Therefore no deep action would seem to be necessary to destroy these invaders.

Chronic Gonorrhea of the Uterus.—Of eighteen uteri removed by Wertheim for gonorrheal disease of the adnexa, in eight gonococci were still present in the secretion of the uterus. He found gonococci in groups on the epithelium, in the interepithelial spaces, and likewise in the subepithelial tissue. He observed a change to squamous epithelium and a huge infiltration with round cells and leukocytes. Macroscopically such uteri are enlarged, the wall is thickened and hard, and the mucosa is thickened to 5 mm. There is edema of the interstitial tissue. The mucosa is hypertrophied. In one-half of the cases there is also glandular endometritis. (Döderlein uses this observation as an argument against judging of the etiology of endometrial changes from findings by the microscope.) At any rate, the interstitial changes are present.

In chronic gonorrhea of the mucosa, according to Bumm, the invasion is localized to the upper layers. The outpour of leukocytes and the rich cell infiltration of the interglandular connective tissue represent to him a "distant action of the cocci." Bumm says that the invasion of the muscular layers by round-celled infiltration is not caused, as Wertheim says, by the entrance of cocci into the muscle bundles. In a uterus with chronic endometritis and pyosalpinx he believes there is enough chronic irritation and hyperemia to produce such round-celled groups. (He evidently insists on his theory of superficial action.)

Gonococci were also found in the uterine wall in the above cases of Wertheim, just as bacteria are observed there in puerperal endometritis. In many cases there was infiltration of the muscular tissue, growth of the vessel walls, and hyperplasia of the con-

nective tissue. Wertheim believes the gonococci to be present in the inflammatory infiltrations in the muscle tissues.

Symptoms of Chronic Gonorrhea.—Chronic gonorrhea of the uterus, if superficial and limited to the uterus, causes few symptoms. In fact, there may be only a slight secretion, discoverable only by the use of a Schultze tampon (Fig. 11). Therefore we find many cases of unrecognized gonorrhea of the tubes whose only symptom is sterility. If the involvement is deep, there is then chronic metritis. The uterus is large, hard, and the mucosa is hypertrophied. There may be much discharge. In my opinion bleeding, when a symptom, is due to the end-changes in the uterine wall and not to early changes in the mucosa. Conservative treatment may cause great improvement, and then overexertion, abortion, curetting, etc., may cause a return of the fluor, with other symptoms.

Wertheim took five patients with fresh gonorrhea in whom the adnexa were normal and in whom there were no subjective symptoms of an affection of the endometrium. He curretted particles from the corpus mucosa and examination of the sections divulged gonococci in them all. Neither the internal os nor the isthmus of the uterine part of the tube stops the course of the gonococci in an apparently localized cervical gonorrhea.

Diagnosis.—When gonorrhea of the cervix and uterus becomes chronic the discharge becomes less, and then mucoid or mucopurulent and mixed with many squamous epithelia which may contain cocci. When this occurs, the prognosis is doubtful, for the cocci may disappear for weeks and then reappear. Chronic gonorrhea is very hard to diagnose because of the absence of characteristic symptoms, especially so if limited to the cervix. The only symptom is discharge, which is mucoid, sometimes yellow or green, yet, according to Bumm, it may even be clear when gonococci are present.

Döderlein's observation that gonorrheal endocervicitis and endometritis are often hard to determine is justified. A bright red external os is of as great significance as erosions, which are often present. On the other hand, erosions may be absent. There is frequently just a slight eversion of the mucous membrane at the external os. The discharge, if clear, may change after menstrua-

tion and become yellow for a short time. This same change may take place with congestions or after the use of silver. Chronic localized cervical gonorrhea causes so few symptoms that it is generally an accidental discovery. The presence of salpingitis in nulliparæ, if appendicitis, tuberculosis, and sepsis be excluded, is of great importance. The period at which the symptoms first occurred is a point to be learned, for these evidence themselves not infrequently within a short period after marriage or soon after a new infection in the male.

Acute gonorrhea comes from acute gonorrhea in man. Acute vulvovaginitis and urethritis are associated with profuse purulent secretion, intertrigo, and sometimes with Bartholinitis. The vulva is red. If the infection extends upward, we get metritis with fever, pain in the pelvis and back. There is increased size of the uterus, a sensitive uterus, and pus, or pus and blood, from the uterus. In virulent cases there are exudates in the pelvis, in the tubes, in the ovaries, occurring through parametritis and perimetritis and perisalpingitis and peritonitis.

Latent gonorrhea produces the following picture: After marriage there is noted increased leukorrhea, especially at menstruation. There is burning and pruritus in the vulva. There is dull pain in the pelvis and back, which is increased by exertion. Colicky pains occur before menstruation. Pregnancy often ends in abortion, and perimetritis and perioöphoritis occur. Then the symptoms grow worse and are increased by dancing, exertion, coitus. Acquired dysmenorrhea occurs before or during menstruation. There may be irregular menstruation. The patient becomes thin, looks bad, is nervous and hysterical. Examination shows increased secretion from the genitalia. The outlet of the Bartholin ducts is red. There is a glassy or milky secretion from Bartholin's glands, obtained by pressure. There is redness about Skene's glands. There is redness near the small labia.

Condylomata may be found on the posterior commissure or about the anus. The vagina perhaps is a little red. The portio is thickened, the cervical mucosa is red, and ectropion or erosions are observed. The increased secretion from the cervix is sometimes not pathologic in appearance, but oftentimes purulent or

mucopurulent. The uterus is lengthened and sensitive. Perimetritis and parametritis are often present. The ovaries are enlarged and sensitive. Such conditions result from continued infection in the female by non-active gonorrhea.

Gonorrhea with no Clinical Symptoms.—Gonorrhea in the female with no clinical symptoms is frequent. Neisser has called attention to the fact that puellæ publicæ may show none of the clinical symptoms, no redness, no swelling, no purulent secretion from the vagina, uterus, or urethra, and yet may shelter gonococci which produce infection per coitum.

According to Finger, Laser examined the cervical secretion in sixty-seven puellæ publicæ and found gonococci in twenty-one. Of these twenty-one, only four had clinical symptoms of cervical catarrh; the other seventeen, from the clinical standpoint, could be considered normal. Three hundred and fifty-three examinations of urethras showed one hundred and twelve to contain gonococci. Of these, in ninety-one there was no secretion from the urethra; in sixty-one there were no clinical symptoms of urethritis. In 10 per cent. of puellæ publicæ with only mucoid uterine secretion Welewski found gonococci.

This shows the necessity for bacteriologic examination. This is especially necessary after the acute stage is over. In some cases gonococci are easily found for months and years. This occurs in patients who have infection of acute nature and shows an especial sensitiveness and susceptibility on the part of such patients.

Schiller and Bröse in two hundred and thirty-five cases of chronic gonorrhea found, according to symptoms, that the urethra was affected in one hundred and eighty-one, the cervix in two hundred and sixteen, and the adnexa in one hundred and thirty-nine; yet they found gonococci in only 45 per cent. in the urethra and in 32 per cent. in the cervix.

Bumm, in one hundred women suffering for at least five months, found gonococci in the urethra forty-three times, in the cervix ninety-four times. In seventy-four women observed by Bumm for from five months to one year, he found the urethra affected in 95 per cent., the cervix in 70 per cent., the endometrium in 25 per cent., and tubal gonorrhea in 10 per cent.

In the acute cases the microscope shows gonococci in the proto-

plasm of the pus cells and in groups on the epithelial flakes. In chronic cases it often takes several examinations to find the gonococcus. In very many cases they cannot be found at all. Pus or mucopurulent discharge from the glands of Bartholin means gonorrhea. Simple redness of the ends of the ducts, the so-called maculæ gonorrhœicæ are not considered by Bumm enough for the diagnosis, but redness plus pus is sufficient. Abscess of the glands of Bartholin, however, is almost surely gonorrheal. A granular vaginitis speaks for gonorrhea. The presence of cervical erosions and condylomata is a valuable sign. Corroborative but not certain diagnostic points are furnished by a mucopurulent infection of the cervix plus a urethritis. The latter furnishes a more or less continuous discharge from the urethra, the presence of threads in the urine, etc., but a chronic inflammation of the urethra is often evidenced simply by a milky secretion, which can be obtained only if the patient does not urinate for several hours. With a gonorrheal cystitis we have an acid urine.

The diagnosis of the chronic form is difficult, for often no gonococci are to be found. Sänger looks for acute or chronic gonorrhea in the male. Purulent catarrh with other causes excluded is of importance. Inflammation of the Bartholin glands and the presence of maculæ are to be looked for. Condylomata are important diagnostic aids.

A purulent or mucopurulent discharge from the cervix and evidences of inflammation of the adnexa and the peritoneum are most valuable diagnostic points.

Treatment.—In the acute stage rest is most important. Cold applications or the rubber coil are applied to the abdomen. If peritoneal irritation is present, an ice-bag is used. The intestines are emptied by enemata and opiates are given. If there is much discharge, cool vaginal bichlorid douches are given under low pressure. When there is high fever and little discharge, intrauterine irrigations with a double-running irrigator are permitted in postpartum and abortion cases if the adnexa are free of inflammation. With the double-running catheter 1 to 2 quarts of various mild antiseptic solutions are used and at a temperature of 70° to 80°.

In the subacute stage when the fever has ceased, instead of renewed cold applications to the abdomen, a stimulating application in the form of a Priessnitz bandage is used every night. Tepid

vaginal douches are given, and sitz-baths at the bedside, of a temperature of 70° to 85° and lasting five minutes, are sometimes ordered. Rest in bed for six to ten weeks is important.

In the chronic stage of gonorrheal endometritis as much as possible should be attempted without intrauterine treatment. By increasing the circulation in the uterus, increasing the tone of the myometrium, and thorough douching away of the discharge from the vagina, the condition can be markedly benefited and cured, especially if the disease is not intraperitoneal. If there is no purulent inflammation of the adnexa or parametrium or perimetrium, this is accomplished by hot douches given with large amounts of fluid, by hot sitz-baths lasting half an hour, and especially well by carbonated salt baths. Discharge of the secretion is aided by suction and by glycerin and gauze vaginal packing (Figs. 13, 90). This may be followed later by local treatment of the cervix, combined with the cold water vaginal irrigation cure. This consists in daily douches of 80°, gradually cooling subsequent douches down to 60°. If bleeding is a symptom, several douches with 1 to 2 quarts of hot water should be given daily. If this does not help, and if the adnexa are free, the use of local medical treatment and irrigation of the uterus is advised by many. Although I personally disapprove of these methods in the vast majority of cases, I shall mention them.

In gonorrhea of the uterus, Joseph washes the cervical canal three times a week, with the aid of the speculum, with protargol ¼ to ½ per cent., albargin ½ per cent., largin ½ to 1 per cent., argentamin 1 : 1000. He advises daily irrigations with a double-running catheter, using one quart of bichlorid of mercury 1 : 5000. He introduces into the cervix with Playfair sounds 20 per cent. chlorid of zinc or 4 per cent. formalin and packs the vagina with a glycerin preparation. If the gonococci continue to be present in the cervical secretion, the condition has probably extended into the uterus. He then uses the Braun syringe and injects into the uterus every three to four days a mixture recommended by Asch, which consists of:

℞. Alumnol..... ℥ij
Lanolin..... ℥iij
Aq. dest.
Glyc.....āā ℥vj

Or else he irrigates the uterus with a double-running catheter, using a 5 per cent. solution of ichthargan, or else he introduces 25 per cent. protargol suppositories into the uterus. Suppositories 3 to 4 inches long and $\frac{1}{8}$ to $\frac{3}{8}$ inch in diameter can be readily made by any druggist with a base of cacao-butter. They are of value in a base of 95 per cent. glycerin and 5 per cent. stearic acid, or in a base of boroglycerid and gelatin. These two forms demand a special piece of mechanism for their manufacture. Protargol suppositories with these bases (protargol up to 2 per cent.) are sold by various wholesale drug firms.

Finger speaks for radical treatment of gonorrheal endometritis to avoid extension to the tubes. After the acute stage is over irrigations and instillations are used, with or without previous dilatation of the cervical canal. After the first acute stage is over Sänger recommended irrigations with corrosive sublimate combined with 2 per cent. chlorid of zinc solution or creolin or creosote. At times he applies locally 10 per cent. chlorid of zinc. Sinclair recommended the application of tincture of iodin on two or three successive days, which is followed after the discharge of a membrane by renewed application.

Schwarz recommends copious irrigations of the uterus with 1 : 5000 to 1 : 2000 bichlorid or 1 to 2 per cent. carbolic.

Finger introduces into the cervix on a Playfair sound, 5 to 10 per cent. protargol or ichthargan, and in chronic cases tincture of iodin or 5 per cent. acidum trichloraceticum. Siredey recommends 1 per cent. picric acid.

When gonorrheal infections extend up into the higher areas of the uterus, as a rule they do so (1) as a result of injury, such as excessive coitus, which means congestion and continued infection; (2) through work or effort; (3) during menstruation. I do not practice intrauterine treatment, for it injures the tissues, aids the deep entrance of the cocci, and extends the infection. No applicators and no sounds should be used. Treatment should consist of rest, sitz-baths, vaginal packings, and douches. Protargol, dilute bichlorid, and ichthyol solutions are the best. The cases which are hardest to cure are those where the mucous membrane is changed to squamous epithelium and the discharge consists mainly of squamous epithelia.

In treating cervical gonorrhea Bumm makes incisions in the external os, if it is narrow. When the incisions are healed, he clears the cervix of mucus and applies 1 to 5 per cent. silver nitrate at one sitting, until the whole lining becomes white. Ichthyol 5 to 10 per cent. is then applied on cotton or gauze. When the resulting membrane finally comes away, he repeats the cauterization with silver or with chlorid of zinc, and ofttimes the case gets well. If it does not heal or if there are signs of endometritis, he treats the uterus carefully unless the adnexa have been recently affected. If this is the case, he lets even the cervix alone, *for care should be taken to avoid extension to the tubes.*

He begins intrauterine therapy, even with women who have had children, with dilatation of the internal os by laminaria in order to get good drainage. Then he swabs out the secretion and applies 1 per cent. silver or 1 to 3 per cent. ichthyol with Playfair sounds covered with cotton. He makes the application for ten minutes. Injections with a syringe are not advisable. He also uses daily irrigations with a double-running catheter for fifteen minutes to wash out all the folds of the endometrium. He uses silver 1 : 1000 or ichthyol 1 : 100. Sometimes the cocci disappear very soon, but *sometimes they reappear after treatment is stopped*, in which event treatment must be continued for weeks.

When there is a chronic uterine gonorrhea with many squamous epithelia in the secretion and cocci in groups on the epithelia, stronger solutions must be used, such as tincture of iodin, silver 10 to 20 per cent., or strong chlorid of zinc. The resulting strong reaction after such a thorough cauterization, which should be done only once a week, throws off the cocci. *If fever occurs on the day of treatment or if there is increased sensitiveness of the uterus, treatment should be stopped for a while.* (Bumm.)

While for a time the gonococcus infection may remain limited to the cervical mucosa, it must be admitted that it is extremely difficult to tell in some patients when the invasion has encroached upon the uterine cavity. Boldt has, therefore, placed himself on the side of those who at once attack the entire uterine mucosa. If the patient permits it, he puts her under an anesthetic and disinfects the genital tract, and then, before proceeding to dilate the cervical canal, the uterus is copiously irrigated with a double-current

catheter; then the cervix is dilated slowly and gently, but effectually, and a thorough curettage is done with a sharp curet, preferably a Martin curet for the first general abrasion of the mucosa, followed by a small sharp curet used around the tubal openings. The uterus is then again copiously irrigated with plain sterile water or a mild antiseptic solution, and is tamponed with a long strip of gauze soaked in 5 per cent. solution of soluble silver (protargol). The rest of the genital tract is tamponed with iodoform gauze and the patient put to bed. If urethritis is still present, it should be treated at this time, and also the ducts if infected. The gauze is removed on the following day, and on the third day the entire treatment, with the exception of the curettage, is repeated. If consent to curettage is not given, office treatment is used. An intrauterine application is made by means of the intrauterine applicator syringe. The intrauterine tampon is left in the uterus for two or three hours and the patient directed to remove it by means of the attached strings. A medicated tampon is placed in the upper part of the vagina, if desirable, and is held in place by a plain non-absorbent wool tampon. The strings of the tampon are so marked that the patient should know which to remove first. After removal of the tampon a copious antiseptic douche is used by the patient. This treatment is not as desirable as the first, as it is fraught with more risk of causing subsequent pelvic inflammation. The treatment should be repeated every two or three days, and the advantage of a perfectly made intrauterine applicator cannot be overestimated (Figs. 53, 54).

In cases of menorrhagia complicating gonorrheal endometritis, Boldt finds patients benefited by the internal administration of cotarnin hydrochlorate (stypticin), in dose of 3 grains given in gelatin capsules three times daily, if the previously instituted treatment does not have the desired effect. Alone, without local treatment, especially curetting, he finds that it gives unsatisfactory results.

In that class of patients in whom metrorrhagia and menorrhagia are almost uncontrollable, he awaits a non-bleeding period, and then makes intrauterine applications of pure carbolic acid, leaving the intrauterine tampon *in situ* for a couple of hours. The treatment is repeated every second day until six or eight treatments have been applied, and at the end of the next menstrual interval it should

be repeated. He has had no untoward results from the application of pure carbolic acid to the uterine cavity.

GONORRHEA OF THE TUBES, OVARIES, AND PERITONEUM

The tubes may be affected by a rapid upward extension of an acute gonorrheal infection in the space of a few days. Only the virulent cases cause early symptoms, because they affect the whole tube up to the external ostium. An invasion of the tubes, if relatively acute, and if accompanied by peritoneal lesions, is generally recognized as a peritoneal involvement. Acute cases have fever, due to involvement of the deeper structures of the uterus, of the connective tissue, and of the peritoneum. There is then pain, tenderness, slight rigidity, sometimes slight abdominal distention and pain, and colicky pains which are not due to the tubal affection but to the associated metritis.

Acute Salpingitis.—There are cases of gonorrheal salpingitis in which adhesions are very readily formed and the exit of pus is limited without marked involvement of the peritoneum taking place. There are other cases in which the pus is poured out rapidly and in large amounts or else adhesions do not form readily, in which the amount of purulent discharge into the peritoneal cavity is so great that a more extensive peritonitis takes place, and in several well-authenticated cases a so-called general purulent gonorrheal peritonitis has resulted.

The peritoneum is not an epithelial tissue and is much more resistant to the invasion of the gonococci than mucous membrane. A predisposition is necessary, and this often consists in a mechanical injury or irritation. In gonorrheal pelveoperitonitis the serosa of the pelvis, of the uterus, and of the adnexa are highly injected and covered with a layer of cloudy, pus-like fluid, which is also present in the sac of Douglas. This exudate contains pus and intracellulur gonococci. The posterior surface of the uterus and the ligamenta latum of either side are covered with this white membrane, which can be lifted off in small pieces. The serosa, thus uncovered, is rough, dark red, and looks like eroded tissue. These membranes prove to be composed of pus cells, fibrin, and intracellular gonococci. Out of the abdominal end of either tube

comes a white creamy pus containing gonococci. The tubes and ovaries are swollen and congested, having a dark blue, almost gangrenous look.

The degree to which the peritoneum is irritated, and especially the degree to which closure of the abdominal end, with the formation of adhesions, takes place, is of the greatest variability. Tubes may heal and pregnancy may take place, so long as the ends are not permanently closed, and especially if they are not covered by adhesions.

Pyosalpinx.—With these acute attacks, if the outer ends are closed or if adhesions take place at once, acute pyosalpinx may result. We may see this condition resulting in a one-sided pyosalpinx, while the other tube may seem normal. Such patients generally remain sterile, and at a later period the other side may become affected, but not to the degree observed in the earlier acute involvement.

Cases of chronic pyosalpinx with much pus accumulation are only too often the result of recurrent attacks brought on by excessive coitus, physical work and strain, intrauterine treatment, curetting, abortions, etc. Here a state of chronic invalidism may result, due to great adhesions involving the omentum, sigmoid, intestine, etc. If pus pours out rapidly from the tubes, especially in recurrent attacks, we get adhesions of a firm character.

We may get infection of the peritoneum by the cocci passing through the tube wall. Orthman, Menge, and others failed to find gonococci in the wall of the tube, but Wertheim found them up to the peritoneum. Bumm thinks this to be rare. Wertheim believes that the cocci often pass through the tube wall into the peritoneal cavity, and in this way explains fresh recurrent attacks of pelvic peritonitis in cases where the tube ends are closed. Bumm says that the tube ends probably open by pressure from within the tube.

Gonorrheal infection of a mild degree of virulence generally passes upward slowly before or especially after labor, curetting, or abortion. Recurrent mild attacks may be produced by intrauterine treatment or by the curet, and these factors have most to do, in the subacute cases, with driving the inflammation up to the peritoneum and causing adhesions. Those cases of subacute

gonorrheal infection which suffer the most pain have been so treated.

The gonococcus may infect the ovarian follicles and may produce ovarian abscess. The ovaries, however, may be slowly and mildly infected and become diffusely inflamed and adherent. The ripening of follicles is then made difficult; they often degenerate into cysts and the ovaries are indurated. When so affected, the secretory activity of the ovaries is altered and menstruation may occur every six, eight, or ten weeks.

Treatment.—The treatment of acute involvement of the tubes, ovaries, and peritoneum means *rest in bed*, attention to the bowels, the use of the ice-bag or ice-coil, and the usual methods of antipyretic treatment. Cool or tepid vaginal douches, under low pressure, of 1 : 5000 bichlorid of mercury should be given two or three times a day and the associated vulvitis or cystitis should be treated according to the manner explained in the sections dealing with gonorrheal vulvitis and gonorrheal cystitis. Very careful vaginal or rectal examination should determine the character and extent of the involvement and the presence of a peritoneal exudate. In the vast majority of cases of gonorrheal peritonitis the condition is localized in the pelvis. A relatively small number of cases have been reported of general gonorrheal peritonitis. The prognosis is extremely good in all cases with conservative treatment. Only the cases of mixed infection associated with general peritonitis furnish a mortality. In cases of general peritonitis due to gonococci laparotomies have been done with favorable results. Conservative treatment, however, is sufficient, except when the diagnosis of the cause is doubtful.

The following view of Bumm is not to be questioned: A gonorrhea freshly infecting a patient with adnexal disease means that the patient should stay in bed for *two months* and should be allowed to get up only when every bit of inflammation is gone and when, *for four weeks, there has been absolutely no rise in temperature.* Treatment also includes sitz-baths, douches, glycerin tampons, and a "cure," but should be begun only months after the acute attack. A too early "cure" often starts up an extension of tubal trouble.

In gonorrhea in pregnancy there should be no treatment except

perhaps douches, and the patient should stay in bed four to five weeks after labor, until complete involution takes place.

Boldt says: "In acute gonorrheal infections of the adnexa, with or without invasion of the pelvic peritoneum, rest, the application of the ice-coil or ice-bags, a narcotic, preferably in the form of suppositories, for the purpose of lessening peristalsis, and the avoidance of subsequent local examination should be insisted on until the acute symptoms have subsided, when one may begin with warm vaginal douches containing a mild antiseptic. The cold applications should be continued until the temperature is normal and the patient is free from pain. The patient should not leave her bed until the temperature has remained normal for one week, and upon any exacerbation of symptoms the rest treatment should be resumed.

"If at any time the Fallopian tubes become distended with pus, and sink to the floor of the pelvis, further delay with conservative treatment should not be practised. The patient should be anesthetized and the cul-de-sac of Douglas widely opened. The tubes should then be incised and evacuated. There is a class of patients who, while they make a temporary recovery, have more or less pain, either constantly or at varying intervals, with menstrual irregularities and perhaps occasionally acute exacerbations. Bimanual examination reveals evidences of salpingo-oöphoritis with a metro-endometritis. The Fallopian tubes are more or less distended, and sometimes the adnexa and uterus are matted together in the perimetric exudate. It may be impossible in these cases to demonstrate the presence of gonococci." In these cases local treatment has proved useless in Boldt's experience. For him, surgical intervention is the only form of treatment that holds out hope.

"There is another class of patients in whom the disease has to a large extent become spontaneously cured, so far as pyosalpinges are concerned, but the residue of the old chronic pelvic inflammation, consisting of tubes thickened and adherent, ovaries in a constant state of inflammation, and uterus perhaps smaller than normal, in some cases larger. Menstruation with this class of patients is likely to be at longer intervals—six weeks to three months; though in some instances it may be frequent, at intervals of two or three weeks, and the amount of blood lost variable. Severe dysmenor-

rhea may be present. Local therapy seldom benefits this class of women, who usually have been sterile or have but one child. If their suffering makes it difficult for them to pursue their vocation, and they are past the middle thirties, a radical vaginal operation is most expedient. If younger, then a salpingo-oöphorectomy should be resorted to."

CHARACTERISTICS OF GONORRHEA

For many years Bumm and Wertheim have been the leaders in a controversy concerning the relation of the gonococcus to the tissue on which it is implanted. Bumm assumes that in the vast majority of instances the gonococcus is a parasite growing on the superficial layers of the various mucosæ. For instance, he states that in chronic cervical gonorrhea the gonococci are limited to isolated small areas of mucosa in which the gonococci are situated in metaplastic squamous epithelium. The epithelium of the glands he believes to be generally immune, holding also to the belief that while the duct of Bartholin may be invaded by gonococci, yet the gland of Bartholin itself is not so affected. In the uterus he finds the mucosa affected, as a rule, in localized areas and only superficially. On the other hand, Wertheim states that the gonococci may enter the subepithelial connective tissue in any case.

There is no doubt that neither the contention of Bumm nor that of Wertheim forms an absolute rule. Different individuals react differently to the invasion of the gonococcus, and the amount of the discharge, the acuteness of the inflammation, the depth or extent of the invasion, the duration of the affection, and the results of treatment in the various forms of this inflammation differ markedly. Gonorrhea may be acute or subacute, it may be recognized or not, it may be localized or diffuse, it may be superficial or deep. These various combinations depend on the virulence of the gonococci, the susceptibility of the individual's tissues, the degree of congestion existing before infection, etc.

The Light Form.—Bumm divides gonorrhea into a light form and a severe form. He says that the distinction is not due to a difference in the virulence of the gonococci, but to the element of localization. The light cases, says Bumm, are those in which

only the cervix or urethra is affected. The severer cases are those in which the infection has extended above the internal os of the uterus or has invaded the posterior portion of the urethra. While this difference of localization does make symptoms light or severe, there is certainly a difference in the resistance of patients and in the virulence of the gonococci.

The Severe Form.—In those cases which are acute from the beginning, and in whom there is an extension upward, or in whom recrudescences of the original acute attack recur, we find pyosalpinx, infiltration of the uterine wall, abscess formations, peritonitis, etc. In them, of course, the acuteness of the inflammation attracts attention to the nature of the infection, and the subsequent annoyances of pain and sterility are readily understood. Many women, however, in whom upward extension has taken place, if the upward extension occurs late and is of a mild nature, suffer neither from pain nor sterility, or else from sterility alone. (The vast majority of cases of gonorrhea in women are acquired from a male urethritis or prostatitis which gives few or no symptoms, or from cases in which a chronic gleet has been examined by a physician who, finding no gonococci present, considered the patient, according to previously accepted standards, cured. This is the error which aids in the wide spread of gonorrheal infection of the female.)

In further proof that the gonococci may enter the subepithelial connective tissue in any case, Wertheim has shown that they are found, for instance, in the subendothelial connective tissue of the peritoneum, in the bladder-wall, in the wall of the vagina. They have been found in the connective tissue of the synovia, in gonorrheal arthritis, in the tube walls, in edema of the foreskin, in myocarditis gonorrhoica, in endocarditis gonorrhoica. As a general rule, the gonococcus causes no pus in connective tissues, but can do so, as in ovarian abscess, periurethral and perichondrial abscess, in abscess of the uterine wall, in abscess of the cervical glands, abscess of the dorsum of the metacarpus, about the knee-joint, etc. As a factor in mixed affection the gonococcus has been found in cystitis, arthritis, Bartholinitis, parametritis, and in some cases of adnexitis.

Characteristics of the Gonococci.—When growing on a

mucous membrane, where new medium is constantly produced by continued secretion, the gonococcus thrives better than when encapsulated in an abscess, in which event the cocci may die, affected by their own toxins or by the action of other bacteria. As early as six weeks after an acute gonorrheal infection, gonococci were absent in a pelvic abscess which has been opened. Just as in a culture-medium colonies of gonococci die within one or two weeks if not transplanted, so the gonococcus in a chronic case becomes weakened in virulence so far as the affected individual is concerned. Being nourished, however, by continued secretion, it does not die, but becomes less virulent, adapts itself to the bearer, and a chronic or subacute inflammation results. Transplantation to fresh media prolongs the life of colonies of gonococci. When the gonococcus is removed from a gonorrheally infected region to a new area by the irritation of coitus, labor, exertion, or treatment, and especially if it is transplanted to a new individual, it produces a more acute inflammation. In the latter instance, if retransplanted again to the first bearer, it may cause a sharper inflammation on the basis of the chronic form (rule of Wertheim).

Mixed Infection.—The gonococci pass down between the cement substance of the epithelial cells and therefore are not easily washed away. They pass down to the subepithelial tissues and generally stop there. For this reason gonorrhea is frequently a superficial process in the genito-urinary tract, but by no means always so. Wertheim and others have shown that gonococci may produce pus in the connective tissues. Bumm says that this is rare, and that it generally means a *mixed infection.* In acute gonorrhea the microscope shows gonococci alone, but cultures, he states, show other bacteria, especially those of the pyogenic form. These mixed inflammations, as he then views them, evidence the presence of the staphylococcus aureus or the streptococcus. According to Bumm, they change the original character of the gonorrheal infection and produce abscesses in the connective tissues, in the vulvar and urethral follicles, in the glands of Bartholin. They may produce purulent parametritis, pyemia, etc. He disagrees with Wertheim, because he believes in the superficial nature of the inflammation, but he acknowledges that metastatic conditions may occur in the joints, usually in the knee-joints, but

sometimes in all the joints. He also acknowledges the existence of endocarditis. We see, therefore, that gonorrhea may be acute or subacute, localized or diffuse, superficial or deep.

Epidermis-like squamous epithelium offers great resistance to invasion by the gonococci. These cocci, however, readily pass through cylindric epithelium, even if of several layers. In the rectum, for instance, they grow down even to the muscularis. They may increase in connective tissue and cause an intense inflammation. The desquamation of epithelium mixed with polynuclear leukocytes coming from the capillaries produces a catarrh if there is an outlet to the discharge. If the outlet of a duct is closed by a drop of pus or by atresia, then pus accumulates in the gland (prostate, Cowper, Bartholin) and the periglandular tissue is invaded and a pseudo-abscess results. A real gonorrheal abscess may be produced by the gonococci in connective tissue. Such has been noted in muscle abscesses, subcutaneously near joints, in the perineum, in skin abscess, etc. Therefore such complications may occur through the action of the gonococci alone.

However, other bacteria are found in gonorrheal pus. Staphylococci are found in the pus of gonorrheal involvement of mucous membranes and in periurethral abscesses. Streptococci have been found in Bartholin abscess and in gonorrheal pyosalpinx. Therefore, in addition to complications occurring through the activity of the gonococcus only, there may occur mixed infections or secondary infections. In mixed infections the gonorrheal involvement of a mucous membrane furnishes a portal for the entrance of pus cocci. In secondary infections the gonococci cause a complication, and later pus cocci enter and supplant the gonococci, which disappear. Metastases by gonococci may occur through the lymph-channels or blood-channels.

Extension of the Gonococci.—Wertheim says that isolated affections of the cervix are rare and that the infection extends up into the uterus more often than is suspected. Bumm, on the other hand, says that isolated cervical gonorrhea is of frequent occurrence. It may later affect the uterus, in which event it produces marked symptoms. He says that the internal os forms an obstacle, but if this point of limitation is overstepped, the symptoms are much more severe. The causes which lead the cocci

into the uterus are menstruation, overactivity, excess in venery, the use of the sound, the use of the curet, the puerperium, etc. After the gonococci pass the internal os they generally stop at the tubal ostia, but the same causes mentioned above may produce an extension into the tubes, etc., for the gonococci of themselves have no power of motion.

Virulence of Gonorrhea.—This difference of opinion is to be reconciled by realizing that the virulence of a gonorrhea in the female depends on the character or virulence of the gonorrhea in the male at the time of the production of infection. A most important fact is that on which Döderlein also lays stress.

Döderlein says that acute gonorrhea in the female comes from acute gonorrhea in the male, and that subacute gonorrhea in the female comes from a chronic condition in the male. The latter has none of the symptoms of the acute form, often only presenting a discharge. There may be no pus cells in the male secretion, there may be only isolated cocci in the urethra or in the threads, and for that reason the gonococci are mixed with the seminal fluid, and rarely infect the urethra, but infect the cervix alone. Such light cases do not cause pyosalpinx, and by no means do they always cause sterility if no accessory irritation has taken place. (When gonococci are present in goodly number, we find no other bacteria. As the gonococci diminish, other bacteria come into the field.)

Changes Produced by Gonococci.—The characteristic change in gonorrheal infection is round-celled infiltration, and regeneration is associated with the formation of squamous epithelium. If squamous epithelium is found in a long-continued discharge, this change is of bad prognostic meaning. Chronic gonorrhea of the cervix and uterus, according to Bumm, means the presence of mixed bacteria together with the gonococci. In chronic cases the gonococci may remain on the surface of the new squamous epithelium. There is caused a light but steady secretion which may be increased by irritation, and the cocci may take on a new growth. Their presence in the pus cells does not represent phagocytosis; on the contrary, the gonococci eat up the protoplasm which is rich in peptone. They grow well on the surface. On the other hand, they die quickly in a closed pus cavity, as in an obstructed Bartholinitis or in a pus tube.

Gonococci in Relation to Pregnancy.—Localized cervical gonorrhea does not affect conception. In chronic gonorrhea of the uterus Bumm sees no obstacle to pregnancy if the tubes seem normal. Even if the tubes are affected, they may subsequently return to the normal. On the other hand, it may be said that the tubes may be affected and yet seem normal on bimanual examination. Bumm says that chronic gonorrhea in the second half of pregnancy generally goes on without symptoms. In the earlier months the presence of the gonococci may cause abortion or disease of the decidua. If gonorrhea is acquired during pregnancy, the infection remains in the urethra or cervix, but has a marked tendency to produce abscess in the glands of Bartholin. The gonococci always increase markedly during the post-partum period.

Krönig examined one hundred and seventy-nine cases of puerperal endometritis and found gonococci in the lochia of fifty. They increase in the first few days and then disappear entirely or gradually. Bumm says that while in the cervix of pregnant women cocci may be found only in small numbers, yet in the lochia from the cervix on the second to the fifth day post-partum they are found in huge numbers and the cocci are large and plump. Toward the third week of the puerperium they are hard to find if the secretion becomes mucoid. In some cases it is easy to find them for weeks if the secretion is not mucoid. In the early puerperium there is generally no fever and no symptoms. If there is temperature, it is very low and lasts but two or three days. This is either due to an absence of extension or to a slow extension or to slight virulence. In the later puerperium, after the patients get up, there is observed a marked tendency to an ascending inflammation, as was first pointed out by Sänger. Then we get metritis, parametritis, and salpingitis. Fever cases occurring late in the puerperium with symptoms of localized peritonitis forebode gonorrhea. Many women go through several labors without an upward extension from the cervix or even from the uterus.

The pioneer in the field of gonorrhea in observing its wide spread among all classes of society is Noegerath, who set down his views in his work, "Die latente Gonorrhöe" (Max Cohn & Son, Bonn, 1872). According to Noegerath's original opinion, three out of five married women have gonorrhea, but he later modi-

fied his figures. According to Kehrer, one-third of the sterile marriages are due to the male through azoöspermia or oligozoöspermia which can generally be referred to epididymitis. Bumm quotes E. Schwartz as saying that of one hundred men, ten carry a chronic gonorrhea into the marriage state, while ten more acquire a fresh gonorrhea after marriage, so that one woman in five becomes infected. Bumm says that, according to statistics, 12 per cent. of marriages are sterile. On the basis of Noegerath's figures, it would appear that 8 per cent. of all marriages are sterile through the gonococcus. One hundred and ten cases of primary sterility gave Bumm only 30 per cent. as due to gonorrhea. *He says that very many women with cervical gonorrhea bear several children.* Gonorrhea, according to him, plays a greater rôle in the production of secondary sterility. When examinations are made by various observers in obstetric clinics, gonococci are found in pregnant women in from 12 to 30 per cent. of the cases. If we could add together (1) the cases of primary sterility in which spermatozoa are present in the male, (2) cases of secondary sterility (which are generally not included under statistics of sterility), (3) many cases of ectopic gestation, (4) cases of gonorrhea localized in the cervix in patients who are not sterile, (5) cases with gonococci in the lochia in whom sterility does not take place, (6) cases operated on for gonorrheal disease of the adnexa, and never classed under sterility, but called pyosalpinx, etc., I am sure we would agree that a very much larger percentage of women suffer from gonorrheal infection than is medically believed.

Difference Between Gonococci and Pus-producing Cocci.—The gonococci differ in their activity from the pus cocci. The pus cocci enter tissues more intensively than do the gonococci. The pus cocci grow faster and make their way independently. The gonococci, being weaker, seek interepithelial passages, connective-tissue spaces, and cavities. They have less energy than the pus cocci. Gonorrheal inflammation is purulent. The gonococci cause much granulation tissue early and the inflammation becomes readily subacute. There is a tendency to the formation of connective tissue, resulting in scars and strictures. The gonococci are easily destroyed by high temperature and by fever. Therefore the gonococci, as compared with pus cocci,

are weaker, more readily affected, and produce more benign acute processes.

GONORRHEA IN THE MALE

The secretion after a recent gonorrhea in the male contains shreds, which result from catarrhal desquamation of epithelium, and polynuclear pus cells held together by finely granular mucin. Cloudy urine results from a diffuse catarrhal affection of the mucosa and glands with degeneration of the epithelia. Shreds, pus, cloudy urine, signify a recent, still diffuse urethritis.

The older the process, the slighter are the diffuse catarrhal changes, the less is the hyperemia, and the less is the mucus. Only localized areas then produce a secretion which consists of epithelial cells and pus cells held together by mucin and appearing as shreds. Shreds in clear urine signify chronic gonorrhea. If such a form is irritated, then catarrhal symptoms (hyperemia and production of mucus) start up again about the fixed chronic areas and then disappear.

In acute purulent gonorrhea of the urethra in the male gonococci are present. In the chronic form it is often hard to find them in the shreds or in the "pus drop." One may examine for days and find various bacilli and cocci and no gonococci. If an exacerbation of the process occurs, then in the increased pus we may find gonococci easily, while the other cocci disappear. This disappearance is constant. In acute cases no bacteria, or very few bacteria or cocci other than the gonococci, are found. We can artificially produce an exacerbation by the use of silver nitrate or by irrigation with 1 : 20,000 bichlorid of mercury.

There are cases of male gonorrhea where, in spite of frequent examinations continued for several weeks, and in spite of one or more artificially produced exacerbations, no gonococci can be found. The pus and shreds show no germs or else other germs, but no gonococci are present. We may come to the conclusion that the gonococci have disappeared, but that the changes produced by their presence continue. In many cases of chronic gonorrhea examination of shreds shows no gonococci and no other germs. In some cases, even as early as the terminal stages of an acute gonorrhea, other micro-organisms are found in addi-

tion to gonococci. This is often the case in chronic gonorrhea. Generally they are bacteria of various length and thickness. There are cocci in short chains and groups. These bacteria enter the urethra in coitus and grow on a diseased mucosa and may keep up a chronic stubborn catarrhal discharge (Finger).

Streptococci, staphylococci, and bacterium coli have been found in shreds and in the secretion of the posterior urethra. These may infect the female and cause a cystitis and pyelitis.

Views on Marriage.—Finger allows marriage after chronic gonorrhea (morning drop or shreds) "if repeated daily examinations of secretion and shreds show that these contain only epithelia and *no pus cells*, and if, after irrigation with silver or sublimate, and the production of a purulent discharge, the discharge shows no gonococci. The absence of gonococci, the absence of pus cells, the absence of periurethral complications are essentials. *So long as the secretion or shreds contain pus cells we know that inflammation has not ceased.*" While inflammation may continue even where the original cause of the trouble (the gonococcus) is gone, "yet this is not the case so very often." *A negative result, i. e., the inability to find the gonococcus, does not prove that no gonococci are present.* Finger advises against marriage so long as pus cells are present. Kopp, in seven men with chronic gonorrhea, found no gonococci in the secretion after fifteen to twenty-two examinations, and yet these men infected their wives. Jullien, Wossidlo, Finger, and others report infection of the wife in spite of the fact that repeated examinations showed no gonococci and in spite of the fact that cultures were negative.

UNRECOGNIZED GONORRHEA IN THE FEMALE

Readily as we diagnose gonorrhea in the male, just so poorly do we recognize gonorrhea in the female. The element which attracts attention in the male is the primary urethritis, accompanied by pain, burning, and discharge. From this come all the subsequent troubles. Through this urethral channel the various genito-urinary complications arise. In the female the urinary and genital organs have separate canals, and urinary and genital in-

volvements by gonorrhea may occur independently or may be of different degrees of severity. An originally acute localized involvement in women often attracts little or no attention. A subacute invasion may, and frequently does, attract no attention at all.

Urethritis.—An acute anterior urethritis in the female often causes such slight annoyances that the patient does not seek the services of a physician. Acute gonorrheal urethritis in the female has a tendency to heal without treatment in six to eight weeks. In other cases the discharge gradually becomes less, the symptoms improve, but a secretion persists, either because of a deep involvement of the mucosa of the urethra or because of an involvement of the urethral glands. Such a condition can be seen to develop after an acute gonorrheal urethritis.

Many women come to us suffering from chronic urethritis without any evidence of genital lesions, though in many cases there is an associated cervical catarrh. Massage of the urethra, done several hours after the last urination, discloses a white, milky, mucoid discharge. The urethra may be sensitive and infiltrated. Examination of the discharge shows a few pus cells and a huge number of squamous cells of various shapes and sizes. Bacteria and cocci of different forms are often present, but very often no gonococci are found. There may be a history of relatively acute onset, the symptoms manifested at that time being frequency of urination and burning micturition. In some cases maculæ gonorrhœicæ are present or there may be clear evidences of a cervical gonorrhea. The findings under the microscope in patients seen for the first time years after the beginning of their annoyance is exactly like that obtained in those acute cases which become chronic under our eyes. The same etiology is to be considered. The clearest cases are nulliparæ in whom no pregnancy could have produced a septic involvement of the urethra, in whom there never was opportunity for the production of a catheterization cystitis, and in whom no fistulas are present. The absence of gonococci in the secretion and the presence of pyogenic cocci and bacterium coli is no reason for excluding an original gonorrheal etiology.

I am of the opinion that the vast majority of such cases are due to a previously existing gonorrheal infection.

Anal and Rectal Gonorrhea.—The unusual location of a gonorrhea may prevent its recognition at that particular point. Involvement of the anus and rectum by the gonococcus is by no means so rare in children and certainly not in adults. Baer found that, in one hundred and ninety-one cases of gonorrhea, there was rectal involvement in 30 per cent. There is a sensation of heat and burning, increased on defecation, and characterized especially by fissures. In four cases in children and in many cases in adults suffering from fissure of the anus, with pain on defecation, sometimes accompanied by the presence of blood, I have been able to obtain smears in which the gonococci were readily found. I have been surprised to find this condition in several cases in adults who complained only of the rectal annoyance and who had not the slightest subjective symptoms of a gonorrheal genital infection. That such a rectal and anal condition may exist without the finding of gonococci is to be expected, for a study of gonorrhea in other locations shows that eventually secretion is diminished or absent and the cocci disappear or cannot be found. In the majority of such cases we should find objective evidences of a cervico-uterine involvement.

Gonorrheal Peritonitis.—Because the symptoms resemble other conditions, a gonorrheal etiology is often overlooked. A gonorrheal infection in children may spread upward into the uterus, up through the tubes, and involve the peritoneum with such rapidity that the vulvovaginitis has scarcely time to attract attention. In other instances the vulvovaginitis causes so few annoyances that little attention is paid to it. An involvement of the pelvic peritoneum and of the general peritoneum by the gonococcus is by no means unknown in children. It occurs with all the evidences of peritonitis and is sometimes very sharp in its onset, producing rigidity of the recti, temperature, pain, vomiting, and abdominal distention. In the absence of a recognized cause it is generally diagnosed as appendicitis, and frequently operation is performed for this indication. The rule should be formulated that every attack of peritonitis in female children which simulates appendicitis should have the gonorrheal possibility excluded. While operation is not followed by bad results, yet these cases improve on symptomatic and non-operative treatment.

The same point holds good in adults in those cases where there is rapid upward extension and infection, there being often no local symptoms whatever to call attention to the specific etiology. The symptoms are those of a peritonitis. In those instances in which adhesion of the tube does not occur quickly and in which the pus is poured out into the peritoneal cavity, and is accumulated in the cul-de-sac of Douglas, bimanual examination in patients with very tender abdomens and with rigid recti, may give no tangible evidence of involvement of the adnexa. The diagnosis may then be in doubt. In such cases, where a local specific infection is not thought of, the diagnosis of appendicitis is often made, and only operation discloses the real condition of affairs. In gonorrheal peritonitis the appendix is, as a rule, reddened, inflamed, and edematous, and if a small incision is made, the real condition may be overlooked.

A frequent cause of failure to recognize the existence of gonorrhea is due to the mild nature of the infection. To most of us, if the first five days after labor are passed without a rise of temperature or pulse the probability of a post-partum infection of any sort is generally not feared. Yet there are cases where at the end of the first week, or more particularly at the second week, rises of temperature, not always high, are noted. Examination may show no marked parametritis, no involvement of the peritoneum, there may be no pain. Frequent and continued examination of the lochia will disclose in many of these patients the presence of the gonococcus. On the other hand, continued routine examination, persistently carried out, will often show the gonococcus to be present, even in post-partum cases, when no rise of temperature is noted (Krönig and Stone).

Such involvement results in the so-called "one-child sterility" and in changes in the tubes. A parametritis, especially localized along the tube and near the ovary, and constituting a paraoöphoritis or parasalpingitis, is very frequent and very frequently undiscovered.

Gonorrhea is often unrecognized because the original characteristics have worn off in the course of time.

Cyst of the Gland of Bartholin.—When an abscess involves the gland of Bartholin and calls for incision, very few doubt that

the gonococcus is at fault. There are many instances of gonorrheal infection of the gland of Bartholin in which no abscess results. The duct is not closed and in the course of time the discharge becomes less purulent, finally becomes mucoid, and often of a normal color. If then atresia or obstruction of the duct occurs, a cyst of the gland of Bartholin results. While not generally so considered, there is no reason to doubt that many of these instances are to be referred to a gonorrheal infection of the gland, existing perhaps for years, and even to be referred back to the time of childhood. Therefore the resulting cyst contains an accumulation in which no gonococci are found and which seems under the microscope scarcely pathologic.

Vulvovaginitis in Children.—The finding of purulent secretion and the absence of gonococci therein under the microscope does not exclude gonorrhea. Vulvovaginitis in children is attributed to various irritative causes, to various saprophytes and bacteria, and to the gonococcus. In children an acute vulvovaginitis with purulent discharge, in which the gonococci can be found, is by no means seldom. When the condition becomes less acute, although numerous pus cells are present in the discharge, gonococci are not so readily discovered. At a still later stage, when the pus cells are still fewer in number, it is a wearing task to find gonococci. In those long-continued chronic cases there is involvement of the cervix and of the uterus, and, as is also observed in adults, the microscopic finding of the gonococcus is by no means an easy procedure. The vaginal speculum in children shows a granular vaginitis and cervical erosion. Therefore these old chronic forms, as well as cases which are subacute and non-virulent from the beginning, are often considered, because of the absence of gonococcus findings, as due to other bacteria, whereas a large proportion of them are undoubtedly gonorrheal in etiology.

The Diagnosis of Chronic Gonorrhea of the Cervix and Uterus.—In diagnosing chronic gonorrhea of cervix and uterus in adults we are dealing with greater obstacles than hamper the genito-urinary surgeons in making their microscopic determinations. It is rare that a gleet or a pathologic prostatic secretion or threads in the urine appeal to any one save as an evidence of a

previously existing posterior urethritis of gonorrheal nature. In women other bacteria are concerned in producing inflammatory involvements after labor, abortion, artificial abortion, etc. When looking for gonococci in the prostate one may use the so-called beer or coitus or silver tests, and by massage of the prostate may obtain a secretion showing gonococci. In women we are limited to frequent examination, especially after menstruation. The advisability of using intrauterine applications for increasing the secretion is a matter of dispute, but when done is of great aid. In women we find still greater difficulty, for the cervical mucus makes the discovery of gonococci by microscope or by culture difficult or impossible. Gonorrhea in the female may heal to all intents and purposes. Fluor is reduced to a minimum and no evidences are present in the external genitalia. In fact, in the vast majority of cases no alterations are present in the external genitalia. A history such as is always present in the male is often absent. If in a chronic prostatitis gonococci cannot be found, and if the chronicity of the lesions is attributed to other associated bacteria or cocci, the disease is nevertheless gonorrheal in origin. The same is true in women, for when other bacteria and cocci come into the field the gonococci tend to disappear. We must parallel the experiences of genito-urinary surgeons and adopt the principle that the absence of gonococci in a pathologic cervical and uterine secretion, or even the absence of an evident secretion, by no means excludes the gonorrheal etiology of an active or passive, objective or subjective, alteration of an inflammatory nature.

Diagnostic Value of Intradermal Injection of Gonococcus Vaccine.—Vaccine injected into the skin shows a beautiful result, similar to the "stitch" reaction obtained by Hamburger and by Mannheimer in tuberculin diagnosis. London calls attention to the diagnostic value of this method of intradermal injection of a few drops of gonococcus vaccine, 50,000,000 to 100,000,000 per c.c. in saline solution. In positive cases, an area of erythema develops from one to three inches in diameter, in the center of which there is a small red papule, a little deeper in color than the surrounding areola. This central papule is really composed of two parts, one at the site of needle puncture and the other at the periphery of injection. Normal saline solution

may be used as control, but is not necessary, as London has used a few drops of a solution containing 500,000,000 per c.c. without any reaction in negative cases. Oftentimes the entire area of reaction is slightly elevated. Adjacent lymph-nodes are not enlarged. In negative cases there is no reaction or yellowish discoloration at site of injection. The reaction appears in from twelve to twenty-four to forty-eight hours, the central papule being the last to disappear (J. London).

Use of the Microscope.—The use of the microscope has done much to hinder the diagnosis of old or subacute cases of gonorrhea in adults. A casual examination resulting in the discovery of no negative Gram diplococci has in innumerable instances excluded gonorrhea as the cause. In old cases the staining of several slides and several hours spent in their study are necessary to the finding of the much-sought-for cocci. When gonorrhea of the cervix and uterus becomes chronic, the discharge becomes less, and then mucoid or mucopurulent and mixed with many squamous epithelia which may contain cocci. When this occurs, says Bumm, the prognosis is doubtful, for the cocci may disappear for weeks and then reappear. The only symptom is discharge, which is mucoid and often yellow or green; yet, according to Bumm, gonococci may be present even when the mucus is clear.

Chronic gonorrhea of the cervix and uterus, according to Bumm, means the presence of mixed bacteria together with the gonococci, a fact which still further confuses an attempt at diagnosis by microscope or culture.

Clinical Diagnosis of Latent Gonorrhea.—Are we in a position to clinically diagnose chronic gonorrhea when few pus cells and no gonococci are found? I believe that certain cervical alterations are of importance in this connection, especially when a chronic urethritis is not present, when maculæ gonorrhœicæ or other external evidences are absolutely absent, and when tubal and peritoneal changes are not marked.

Erosions of the Cervix.—This is a condition which is extremely frequent and is generally noted in nulliparæ suffering from cervical or uterine catarrh. It is due to the maceration and destruction of the squamous epithelium about the external os and its replacement by the cylindric epithelium which normally lines

the cervix. When this condition exists in nulliparous women who have not been curetted, or in whom other means of infection are to be excluded, a gonorrheal infection must be considered. (For me, after close observation, the axiom has been adopted that cervical erosions plus a pathologic cervico-uterine discharge in nulliparæ are presumptive evidence of cervico-uterine gonorrhea.) In addition to erosions, there is a characteristic cervical catarrh. The cervix is dilated, there is an extremely thick plug of mucus filling the cervix and protruding from the external os. Its color is white and yellow. With it there is a reddened external os, if erosions are not present. Examination of the secretion shows mucus, squamous epithelia, and many leukocytes. Pure pus in this cervical type is not found. The mucus has a destructive action on all the cells which are taken up in its structure, and their form is changed. Bacteria are almost never found in the mucus. For that reason gonococci, unless the cervical wall is scraped or unless the uterus is involved, are almost never found. This condition is seen to develop in patients who have been treated for acute cervical gonorrhea, and is most frequent in those cases in whom the main activity of the gonococci seems to be limited to the cervix. When existing in nulliparæ and when present to a marked degree in uniparæ, it is for me extremely suggestive of the existence of a cervical gonorrhea, even if no erosions are present and even if no involvement of the adnexa can be made out. I base this opinion upon the fact that many such patients have salpingitis and oöphoritis and on the finding in one-third of the cases of gonococci after prolonged examination.

Parametritis posterior is a very frequent condition. This is a lesion which occurs in nulliparæ, and especially in women who have borne one or more children. In the latter it often produces symptoms shortly after childbirth, but may give no symptoms then. It consists of a slowly progressive chronic infiltration of the uterosacral ligaments and the pelvic connective tissue surrounding the posterior fornix. The parturient cases have only slight or no temperature reactions, suffer from pain in the back, convalesce slowly. Bimanual examination shows an exceedingly tender, edematous, or infiltrated posterior parametrium. There is also present a reddened external os and slight or large amounts

of cervical discharge. Careful early examination in these early cases often discloses the gonococcus. In other cases the gonococcus cannot be found, but the parallel with other instances makes this etiology extremely probable. When this condition continues, there results a sclerosis of the uterosacral ligaments on one side or on both sides. Associated with it is a chronic cervical catarrh, though the latter in the course of time may so improve as to give only minimal evidences. This condition is by no means infrequent in nulliparæ suffering from chronic cervical catarrh, in whom no other factor but the gonococcus can be referred to as the cause. Its presence in nulliparæ in conjunction with erosions, red external os, and pathologic cervical discharge means, for me, the diagnosis of gonorrhea. A frequent location of the parametritis is along the course of the tubes and near the ovary. It is responsible in many cases for an acquired ovarian dysmenorrhea with varicocele of the broad ligaments.

Use of the Curet.—Those who have observed the tendency to the indiscriminate use of the curet for the cure of primary sterility and for the cure of uterine catarrh have noted that in many cases the cervico-uterine catarrh did not improve, that in some cases it was made distinctly worse, and that in many cases the result of dilatation of the cervix and of the curettage was pelvic pain and temperature. Examination discloses an involvement of the parametrium on one side or the other, or an inflammatory involvement of the uterine adnexa of one side or both sides. In fact, a large proportion of cases of sterility associated with pain which I have had the privilege of observing are such patients as have been curetted for primary sterility. Infection of the usual septic character can often be excluded, and we are forced to the conclusion that dilatation of the cervix and curettage often set into more active being the slumbering cocci of a non-recognized gonorrheal catarrh of the cervix and uterus.

There is found in many women suffering from sterility, and especially in such as have been curetted for sterility, a mild one-sided or double-sided salpingo-oöphoritis, associated with pain in the region of the ovaries. In these cases there may exist erosions or cervical catarrh, or these conditions may not be marked. If tuberculosis can be excluded and if a previous appendicitis has not

existed, the cause, in the vast majority of instances in nulliparæ, is to be referred to a mild gonorrhea. On operation those cases not infrequently show closure of the tubal ends or cobweb adhesions around the tube and ovary which to all intents and purposes close the ends of the tubes. This condition is frequently one-sided, and after abdominal operation, and more frequently if a curetting be combined with the operation, an extension to the other side in the course of time is noted. In this condition there is not infrequently found small cystic degeneration of the ovaries. Particularly in those cases in which the ovary contains one large cyst the size of a walnut, and in which the broad ligament veins constitute a varicocele, the probabilities are that we are dealing with an infection of a ruptured Graafian follicle which, after its closure, becomes distended by the accumulation of secretion within it.

Sterility in very many cases is to be referred to lesions of the tubes. Given a sterile woman with well-developed uterus and ovaries (if the spermatic fluid is found normal), and, if stenosis of the cervix and the internal os can be excluded by treatment or operation, the cause of the sterility must be referred to the tubes. Such cases are frequently found after curetting. We may safely take it for granted that there exists a mild inflammatory involvement of the Fallopian tubes, perhaps only affecting that part close to the uterus, but quite sufficient to destroy the activity of the ciliated epithelium. As a result the ovum cannot enter the uterus and sterility is the consequence. In this way can be explained many cases of pregnancy occurring years after marriage, especially in those cases where treatment was finally given up and several years have elapsed, during which time the natural resistance of the patients has restored the tubes to a normal condition.

Ectopic Gestation.—The cause of ectopic gestation is to be referred, in the majority of cases, to some obstruction in the inner lining of the tube. There is either a mild fresh salpingitis or there is an old, nearly cured salpingitis. The ciliated epithelium in the outer end of the tube is not yet involved or else has been restored to normal activity, but beyond that the tube is either obstructed by adhesions of tubal mucosa or by an edematous mucosa or else the ciliated epithelium is not functioning. The finding of cilia in sections of the inner area of the tube has been very

extensively used as a refutation of this causation. It may be said that finding cilia is no proof of their activity, for even in pyosalpinx in certain areas the ciliated epithelium is to be found. Therefore, an ovum given off from the ovary, if fecundated, passes along the tube up to the point where there is an obstruction or where ciliated epithelium no longer functionates, rests there, continues its growth, and ectopic gestation results. The occurrence of ectopic gestation after long periods of non-artificial sterility, the occurrence of repeated ectopic gestation, the frequent finding of adhesions or scars in the tube, and the by no means rare inflammatory involvement of the opposite tube speak for such a tubal alteration in many cases. In many cases in which at operation I paid particular attention to the opposite tube, there was found a closed outer end. Adhesions were present about that tube and ovary, *i. e.*, alterations of such a character as to warrant removal. That gonorrheal infection is the cause in a goodly proportion of cases is my opinion.

Course of Mild Gonorrhea.—The main reasons why the conditions to which I have referred constitute unrecognized forms of gonorrhea are two: Either the original gonorrheal infection was so situated as to cause bearable annoyance, as is often the case with gonorrhea of the urethra, and involvement of the cervix if both remain localized, or the situation is unusual and occurs with symptoms resembling other diseases, or else the original infection was of so mild a character as never to attract the attention of the patient at the time. Such is the history of the vast majority of infections which take place in the female. They are the result of old, chronic, supposedly cured or supposedly harmless involvements of the prostate or seminal vesicles. Such gonococci have a tendency to form superficial involvement, and there is nothing in the character of the infection to attract notice. In these mild cases the urethra is rarely involved, for the simple reason that the infecting cocci are mixed with the seminal and prostatic secretion and are deposited in the vault of the vagina. There results finally a cervical catarrh. Extension is favored by rough intracervical manipulation, by curettage, by operation, by labor, and by abortion. In an acute gonorrheal involvement it is not easy after a certain period to find the gonococci extracellular or intracellular.

In these milder cases it is extremely difficult to find them because of the mucoid character of the cervical discharge and because the cocci in the depths of the glands are not cast off in slumbering cases without stimulation or irritation. Were such conditions to be found in multiparæ alone, it would be difficult to form a definite opinion. Even here, the fact that a woman has borne several children does not exclude the existence of a cervical infection. Many women with a cervical gonorrhea which remains localized go through successive pregnancies. It is probable that an involvement of this mild nature which does not, post partum, extend upward and involve the uterus, tubes, and peritoneum after the first labor, and which therefore permits of a second pregnancy, will, in all probability, never extend further than the cervical lining, and if it does so its course will be mild. When gonorrhea of the cervix and uterus becomes chronic, the discharge becomes less, and then mucoid or mucopurulent and mixed with many squamous epithelia which may contain cocci. When this occurs, says Bumm, the prognosis is doubtful, for the cocci may disappear for weeks and then reappear. The only symptom is discharge, which is mucoid and often yellow or green. The milder lesions referred to, and which affect the cervix, the posterior parametrium, the uterus, the peritoneum, and the ovary, are frequently found in women who have borne one child, but most frequently in women who are sterile. In the majority of such cases no other etiology than gonorrhea can be found. No etiology can be considered, except a mild infection from below by the gonococcus from a dormant male prostatitis. I have come to this conclusion from a study of cases acutely infected by the gonococcus and in whom the gonococcus was clearly demonstrated. In the course of months and years the original typical character of the inflammation changes to a type so often found on the first examination of long-suffering patients. Therefore, when such cases, particularly nulliparæ, are seen for the first time, and present the typical picture of erosions, of cervical catarrh, uterine catarrh, salpingitis, mild salpingo-oöphoritis, mild tubal adhesions, and sterility, and if primary intraperitoneal causes can be excluded, the only conclusion to be reached is that we are dealing with subacute infection, probably by a nonvirulent type of gonococcus. Examination of the husband will dis-

close a prostatitis or show threads in the urine or divulge the history of a new infection after marriage.

Virulence of the Gonococci.—Many observers will not grant that there is a difference in the virulence of gonococci. They say that when transplanted to new soil, any gonococci may cause acute infection in favorable soil. Mild attacks, they say, are due to the resistance of individuals or to the element of localization.

Bumm says that the severity of the infection depends on the localization, that gonorrhea is light if located in the cervix or urethra, and severe if it extends upward quickly. Bumm says that it is often isolated in the cervix, while Wertheim says that it is in the uterus much more often than we realize.

On the analogy with other bacteria we have the right to predicate various degrees of virulence in different gonococci. It is natural to expect that gonococci few in number and found with difficulty in the male prostate years after the original infection may cause a less acute involvement of the cervix than the cocci from a fresh or recent gonorrhea in the male. While I have no warrant for this statement on the basis of experimental proof, I may quote the opinion of Döderlein that acute gonorrhea in the female comes from acute gonorrhea in the male, and that subacute gonorrhea comes from a chronic subacute disease in the male. The subacute form has none of the symptoms of the acute form, often presenting only a discharge. With this statement I agree on the basis of clinical facts.

GENITAL SYPHILIS

Hard chancre is an ulcer developing two to three weeks after infection by the spirochæte pallidum. It is not deep, but flat and plate-like in form, sometimes elevated. The base is smooth and shining; the secretion is slight, not purulent but serous.

In women the induration and hardness which are considered to be characteristic of this primary lesion of syphilis are not so frequently noted as in men, and if present they last but a short while. In fact, this primary lesion is rather difficult to find in women, and it often escapes observation.

Usually there is only an erosion of the mucous membrane which represents nothing characteristic, and which may easily be mistaken for a vesicle or harmless lesion. It looks so benign and superficial that the diagnosis is not easy. This small erosion is the more readily overlooked if, as often happens, some inflammatory process associated with secretion is present in the vulva or vagina. The course of this specific erosion is a short one, and generally no sign is left after fourteen days.

If this erosion is present on the labium majus, there is then a marked cartilaginous induration whereby the ulcer is elevated. On the labium minus the hardness is more like that of parchment, and in the vestibule and vagina it is rarely observed. Here there is generally a sharply outlined erosion of the color of muscle tissue.

Sometimes chancre begins, as in men, as a nodule. This is especially so on the outer surface of the labium majus and on the prepuce of the clitoris. Sometimes such nodules develop about a hair-follicle. They ulcerate, and then two or three may be present. These ulcers are sharply outlined and take a long time to heal.

A condition which often accompanies chancre on the large or small labia is known as *œdema indurativum*. Without any evidence of inflammation there occurs a more or less marked swelling, which is firm and does not pit on pressure. It develops slowly and without pain, and the edema may spread to the clitoris and mons veneris.

In the vagina chancre is very rarely observed. It occurs in this location as primary lesion in one case out of two hundred. When it does occur here, it heals in two weeks and causes no symptoms of local annoyance.

The vaginal portion of the cervix is the site of chancre in perhaps 15 per cent. of the cases, according to Joseph. It is most common about the external os, in the edges of the cervical lips, which are rich in glands, and in the lowest third of the vaginal portion. It extends generally over both lips, with the anterior lip usually more involved. It may be single or multiple, round or oval, and of a gray or gray-white color. It heals within two or three weeks, generally without evidence, but sometimes with scar formation. It occurs most frequently in women who have borne children, since the virus enters more readily into the easily injured tissue.

This ulcer of the portio, in the beginning, is hard to differentiate from other processes. Later on it is indurated, sharply outlined, and covered with diphtheritic light membrane. The superficial form resembles an erosion, while the deeper ulcerated form has sharply cut edges. The following dusting-powders are used for the primary lesion:

℞. Calomel..... ℥ss
S.—As dusting-powder.

℞. Europhen..... ʒj
Acidi boric..... ʒij
S.—As dusting-powder.

℞. Xeroform..... ʒij
S.—As dusting-powder.

Lymphadenitis Syphiliticum.—This develops a few days after the primary lesion, or about three or four weeks after the infection. If induration is associated with the primary lesion this involvement usually takes place concurrently with it. The glands nearest the primary lesion swell to the size of a walnut and are movable. Several glands are generally involved and are characterized by a chronic painless growth without inflammatory evidence or redness or temperature, and therefore are called *indolent bubo.* Two or three weeks later than the glands situated near the primary lesion, the more distant glands are involved, and six or eight weeks after infection the lymph-glands of the body are involved, the so-called *lymphadenitis universalis.*

Generally the inguinal glands are first involved, then the iliac, then the axillary, etc.

This chronic indolent lymph-gland swelling is a characteristic and pathognomonic symptom, which justifies the diagnosis of syphilis.

℞. Ung. hydr..... ℥ss
S.—Rub in, daily, a piece the size of a pea over the glands.

Ulcus durum, the primary syphilitic lesion (Joseph), is the first sign of syphilitic infection; from this lesion the neighboring lymph-glands and lymph-vessels are involved. Later the distant glands are affected. Gradually the entire organism is involved by the syphilitic virus, and as a rule in six to twelve weeks the *skin* shows typical evidences of this general infection.

Between the occurrence of the primary lesion and the appearance of the syphilitic general evidences—that is, during *the second incubation period*—the body shows a series of subjective and objective symptoms known as the prodromal symptoms, just as is noted with other infectious diseases. Anemia is a symptom, especially in women. Temperature is noted, generally just before the appearance of the skin eruption. There are frequently nervous symptoms, such as melancholic depression, headache, neuralgia, and the reflexes are increased. The spleen is enlarged and there is pain in the bones and muscles.

When the specific process affects the skin, evidence is complete that the disease has become constitutional (second stage). This early involvement takes the form of copper-brown, polymorphous, slowly developing, diffusely distributed, chronic, recurring syphilides, most frequently in the form of roseola or erythema syphiliticum, small papular and large papular syphilides.

The diagnosis of syphilis is absolutely certain so soon as typical evidences of cutaneous syphilis appear. Of the syphilides, large nodular or papular syphilides, when macerated, become moist papules. These when situated on a mucous membrane are known as mucous patches or plaques. These moist papules may be situated on the vulva, the large or small labia, the perineum, the inner surface of the thighs, and about the anus. The moist papules situated in these regions are known as condylomata lata.

Condyloma latum represents a very red, button-like, warty overgrowth of small or large size, which arises through increased

growth of individual papules or through the union of some of these into large plaques or masses. They have a smooth or papillary surface and are of elastic consistency, but external irritation may cause the surface to take on a cockscomb-like growth, due to development of the papillary bodies, as in pointed condylomata.

Broad condylomata are generally covered by a gray-white membrane, but if kept dry, they change to simple dry papules. Usually the skin areas are involved in a symmetric manner. Especially is this so on a mucous membrane or about the anus. This is due to inoculation by the secretion from these moist papules, especially if associated with an irritation. If the usual superficial destruction extends more deeply into the papillary bodies, we then have a condylomatous ulcer. Sometimes a primary lesion changes to a condyloma latum, or a condyloma latum, through infiltration of the base, may take on the appearance of a primary ulcer. Condyloma latum generally occurs in the first years after infection, rarely later. This form of eruption may recur often. The purulent, foul secretion of condylomata lata is very infectious. They heal well unless condylomatous ulcers are formed, and then these leave scars. They heal well when powdered with calomel or covered with mercury plaster. Condylomata lata on the cervix are rare. For condylomata lata:

℞. Calomel ..... ℥ss
S.—As dusting-powder.

℞. Mercury plaster—emplastrum hydrarg.
S.—Cover daily with a piece.

For mucous patches:

℞. Hydrarg. chlorid. corrosiv..... gr. iss
Æther sulphur..... ℥iss
Spiriti rectificat..... ℥iij
S.—Cauterize daily with this solution.

Or—

℞. Sol. acidi chromici (10 per cent.)..... ℥j
S.—Cauterize daily with this solution.

Gummata occur mostly in the skin, but may be found in any organ of the body. While the other eruptive forms come early in the disease, gummata first appear one or two years or more after the infection (in the third stage). Gummata are contagious and contain the spirochæte pallidum.

The urethra is seldom involved. When affected, it takes the

form of diffuse gummatous infiltration of the walls or of ulcers of the size of a pea or walnut. The ulcer formation is often called ulcus rodens urethræ or ulcus diphtheriticum, which runs a very chronic and stubborn course. It begins as a little ulcer about the urethra, with deep brown, red, shining, smooth base, covered with a grayish-yellow membrane, with sharply outlined edges. It heals under energetic antisyphilitic therapy. It causes few subjective symptoms and often recurs.

Gumma of the vulva begins years after the primary lesion as a painless infiltration of the labium majus. After the infiltration extends to the urethra urination is painful. It generally extends to the perineum, and causes pain on defecation, and the stools contain blood. Rarely are both labia affected symmetrically. After degeneration of the gumma, we have a crater-like ulceration with irregular edges, spreading in serpiginous form and extending to the vagina. The diagnosis is difficult because the primary lesion was probably never noted and because the early symptoms of constitutional syphilis may not have appeared or may not have been noted. Joseph states that most of the cases called esthyomène or elephantiasis of the vulva are gummata.

Gumma of the vagina is very rare and is mistaken for carcinoma. In doubtful cases a syphilitic cure should be tried. It takes the form of an elliptic ulcer, sharply outlined, more or less deep, covered with a yellow secretion, and having a spongy, readily bleeding, granulated base. It is generally situated near the ostium of the vagina.

Treatment of Syphilis (Max Joseph).—The ideal treatment of chancre when localized, and when the period is sufficiently early to be favorable, is excision. The ulcer is lifted up with a pair of forceps and cut off with one clip of the scissors into the healthy tissue, and the wound closed with sutures. If the primary lesion is but little developed, and if indolent lymph-gland swellings cannot be felt, and if the spirochæte pallida are found, excision should be done. If no general symptoms occur, a subsequent course of treatment is not attempted by some until roseola appears.

Excision brings about a rapid local healing within a week, which is a great saving of time as compared with the ordinary treatment of chancre, which lasts quite a period. It certainly diminishes the amount of virus absorbed into the system and the regional

lymph-gland swelling does not take place. If the original excision is not made into healthy tissue or is made late, the scar may become indurated or may break open into a typical chancre. When seen at the stage of typical chancre with induration and regional lymph-gland swellings, these glands may also be extirpated, with probable benefit to the patient, but this implies quite an operation. All this diminishes the virulence of the subsequent general infection. It, however, may only put off the occurrence of the general symptoms, which have been known to appear as long as six months to even two years after the primary excision.

Treatment.—The diagnosis having been made by finding the spirochæte or by waiting for the skin eruption, the first course of treatment should be one by inunction, 45 grains of unguentum hydrargyri being rubbed in daily on the various hairless parts of the body for a period of twenty to thirty minutes. In stubborn cases twice as much unguentum hydrargyri is used. Those parts of the body which are free from hair are selected. These rubbings should be repeated for four days. On the fifth day the rubbing should be done on the back for half an hour by a masseuse. The best hour for these inunctions is before retiring. On the sixth day a bath should be taken. This procedure is repeated until the patient has taken thirty rubs. The mercury is absorbed partly through the skin and partly through the lungs, the mercury evaporating from the skin. Hence some use mercury rubbed into flannel and fastened about the neck and abdomen like an undershirt and worn day and night. Seventy-five grains are rubbed in every two or three days.

The use of unguentum hydrargyri may cause folliculitis: that is, pustules around the hair-follicles. If so, the rubbing with unguentum hydrargyri should be stopped for a few days, and in its place the affected area should be rubbed with:

℞. Zinci oxidi.....ʒss
Amyli.....ʒss
Vaselini flavi.....ʒj

In place of the unguentum hydrargyri there may be used unguentum hydrargyri cinereum cum resorbin. parat. 33⅓ per cent. (resorbin-mercury 33⅓ per cent.), rubbed in from ten minutes to one-half hour.

After this inunction cure there should be a rest of several weeks, which may be well spent at the seashore or in the mountains. Then during the latent stage, unguentum hydrargyri, the size of a pea, is rubbed daily into the inguinal glands and the glands of other parts of the body. This is stopped when no more enlarged glands are to be found anywhere.

If no symptoms such as condylomata lata or mucous patches appear during the next few months, the patient should be let alone; but if these conditions do come on, they should be treated locally. If in spite of local treatment there is no improvement, internal treatment should be used.

℞. Hydrarg. chloridi corrosivi..... gr. ij
Boli albæ præp..... ʒj
Glycerini q. s. u. f. pil. no. xl.
S.—One t. i. d. p. c.

Or—

℞. Hydrarg. tannici oxydulat..... gr. xx
Boli albæ præp..... ʒj
Glycerini q. s. u. f. pil. no. xl.
S.—Two p. c. (Lustgarten).

The inunction cure is to be repeated six months after the first one, even if no symptoms recur or present themselves.

In place of inunctions we may give injections, 15 minims a day, into the muscle of the nates, of:

℞. Hydrarg. chloridi corrosivi..... gr. v
Sodi chloridi..... gr. xlv
Aqua dest. ad..... ʒj

Thirty such injections are given. In place of the above, in order to spare the patient the annoyance of coming too frequently we may use:

℞. Hydrarg. chloridi corrosivi..... gr. x
Sodii chloridi..... gr. xlv
Aqua dest. ad..... ʒj

Give 15 minims once a week by needle for four to twelve weeks.

We may inject calomel, or we may inject:

℞. Hydrarg. salicylici..... gr. xlv
Paraffini liquidi ad..... ʒj

Or hydrargyrum salicylicum in vasenol (10 per cent.), which is sold in sterile glass tubules. Inject 7 minims into the muscle. In four days repeat this; in four days more inject twice the amount, and then every eight days until eight injections have been given in all.

During the entire cure the teeth must be carefully cleansed

three times daily, and every hour the mouth must be washed with half a teaspoonful of liq. aluminii acetatis to the glass of water, or with 2 per cent. peroxid. There should then be a rest of a few weeks and recurrences should be treated by local medication.

Six months after the second cure comes the third cure, either by inunction or injection, plus the use of iodid of potash, of which 600 to 750 grains are taken in doses of 10 grains t. i. d.

When six more months have passed, the last cure by inunction is taken, 45 grains of unguentum hydrargyri being rubbed in daily for thirty days.

At the end of this cure two years have passed since the infection. After a few months of recuperation a total of 600 to 750 grains of iodid of potash are again taken.

In the interval between all the cures enlarged lymph-glands are treated locally by mercury ointment.

If two years have elapsed after the last cure without recurrences, the patient may marry, if first another energetic inunction cure is taken (Max Joseph).

For the differential diagnosis between hard chancre and soft chancre, see page 548.

ULCUS MOLLE (SOFT CHANCRE OR CHANCROID)

A few hours after infection by the soft chancre of another individual a redness occurs at the point of inoculation. After twenty-four hours, sometimes after two or three days, there occurs a pustule which breaks on the second or third day, rarely as late as the fifth. The resulting ulcer is round, deep, as if bored out, and has flabby but sharp, somewhat undermined elevated edges. The base is uneven and covered with a grayish-white, dirty, firmly attached covering. The ulcer bleeds easily, and secretes a very contagious pus.

Soft chancre is caused by the strepto-bacilli described by Ducrey and others. It is diagnosed not only from its appearance, but from its clinical course, for soft chancre is always a local disease.

Soft chancre is an ulcer which takes a slow course. The ulcer does not enlarge greatly and reaches the size of a five-cent piece. In the first three or four weeks the purulent discharge is very

infectious, and by inoculation new ulcers are formed about the original one.

As a rule, with soft chancre, there are several ulcers present. In the fourth week the redness and swelling diminish, the pus becomes less in amount and is no longer infectious. Marked granulation is evident in the base of the ulcer, which may rise above the surface, forming the *ulcus elevatum*. If let alone, it heals in five to eight weeks, leaving a soft scar. In weak individuals the ulcer may take on a gangrenous character or may have a diphtheritic appearance, which forms are rare in women.

Soft chancre occurs mostly on the fossa navicularis, about the external opening of the urethra, or on the clitoris, is often situated on the large labia or on the inner surface of the large or small labia, rarely on the mons veneris, more often about the anus.

Soft chancre rarely occurs in the vagina or on the vaginal portion of the cervix. In this latter situation it represents a sharply edged, easily bleeding ulcer, with thick pus covering it. It spreads rapidly and heals after two to five weeks with the formation of a scar. Generally other ulcers are present on the external genitalia.

In the early stages it should be excised; in the later stages it should be treated with pure carbolic acid or tincture of iodin, followed by the regular use of iodoform, etc., as follows:

℞. Ol. sassafras ..... gtt. ij
Iodoform ad ..... ʒiiss
S.—As dusting-powder.

℞. Europhen ..... ʒj
Acid. borici ..... ʒiij
S.—As dusting-powder.

For condyloma acuminata may develop in the fossa navicularis, on the perineum, in the labio-crural folds, or in the vagina even up to the cervix;

℞. Resorcin ..... ʒiiss
S.—Ext. as dusting-powder.

℞. Liq. potassii arsenitis ..... ʒiiss
Aq. destillat ..... ʒiiss
S.—Applied with compresses to the condylomata several times a day.

Inguinal bubo forms in one-third of the cases. Generally in the first or second week pain is felt in the inguinal region. There is a slight rise in temperature. First one gland swells, and then

others. The glands and the periglandular tissue are involved. The periphery becomes edematous and so is the skin over the glands. Suppuration develops in parts, forming small abscesses which grow larger and finally unite. The treatment is then surgical.

℞. Hydrarg. benzoici.
Sod. chlorid.....ãã gr. xv
Aq. dest. ad..... ʒiij
Inject 2 to 3 c.c. into the glands at intervals of a week as abortive treatment (Welander).

DIFFERENTIAL DIAGNOSIS BETWEEN CHANCRE AND SOFT CHANCRE OR CHANCROID, ACCORDING TO JOSEPH

Chancre	Chancroid
1. Long period of incubation, generally two to three weeks.	1. Short period of incubation. After twenty-four hours there is a pustule; after three days there is an ulcer.
2. Generally single.	2. Generally multiple.
3. Flat or elevated ulcer.	3. Deep, punched-out ulcer.
4. Only a weak line of delimitation.	4. Steep, undermined edges.
5. Smooth shining base.	5. Uneven, punched base.
6. Slight serous secretion.	6. Plentiful purulent secretion.
7. Often a hard cartilaginous base.	7. Soft base; slight hardness in isolated spots.
8. Indolent non-inflammatory bubo occurs shortly after the primary lesion.	8. No swelling of the glands, or else there is a virulent bubo with inflammatory evidences.
9. Secretion is infectious to the patient only for a few days in the beginning.	9. Pus can be inoculated upon the patient and causes a new soft chancre.
10. The spirochæte pallida are present.	10. Strepto-bacilli are the cause.
11. Generally heals without a scar.	11. Heals with a deep scar.
12. Calomel powdered on the ulcer morning and night brings about healing. If it heals slowly, dust it with iodoform or europhen or zeroform. In place of calomel, mercury plaster may be put on and changed every twenty-four hours	12. In the early stages it should be excised. In the later stages it should be treated with pure carbolic acid or tincture of iodin, followed by dressing with iodoform.

VULVITIS

Furunculosis vulvæ is a condition not infrequently met with, especially in older women. A furuncle appears as a small, hard, nodular swelling, which is red and painful. It becomes larger, sometimes extending superficially and forming a pus-nodule; at other times spreading deeply and producing a phlegmon, with quite extensive infiltration of the connective tissue of the large labium. New nodules form as the old ones heal or are treated, and the condition may spread or extend and last for weeks. It is often one-sided.

The Treatment of Furunculosis.—Small unripe furuncles should be touched with pure carbolic acid and then thoroughly painted with several coats of iodin. This may prevent their further extension and development. If a furuncle goes on to the formation of purulent accumulation, it should be incised and touched with either pure carbolic acid followed by iodin or with a 40 per cent. solution of carbolic acid in alcohol. When furuncles, instead of developing superficially, extend deeply into the connective tissue and form a phlegmon, abortive treatment is advisable. Very hot sitz-baths of a duration of twenty minutes should be taken. Moist applications of gauze, saturated in a strong hot solution of acetate of aluminum, should be applied constantly and constantly changed. If this treatment does not suffice to prevent the extension or the breaking down of the phlegmon, incision and surgical treatment are necessary. To prevent the continued extension and continuation of this condition, internal medication should be tried in the form of calx sulphurata or compound syrup of hypophosphites. The urine should always be examined for sugar.

Vulvitis.—The term vulvitis is applied to affections of the skin, of the mucous membrane, or of the glands of the vulva. The term vulvitis is often used to describe conditions involving simply the skin area of the vulva, which strictly do not constitute a vulvitis, but belong rather to the category of pruritus vulvæ. Lack of

cleanliness, especially in older women with lacerated perinea, with resulting mild vaginitis, may involve the skin area of the vulva. Like causes produce skin irritation, such as intertrigo, which occurs in fat persons, especially in the summer-time. There is, in addition, a dermatitis which may spread from the inner surface of the thighs and involves the vulva. It occurs often in fat persons. Such conditions, due to uncleanliness, to contact of the parts, etc., are accentuated by scratching. There may also be conditions of the same character as affect the skin in other parts of the body, such as acne or herpes, eczema, various parasitic conditions. Herpes vulvæ is especially observed in pregnant and fat women. It is characterized by groups of small vesicles whose appearance is preceded by pain. They generally disappear in the course of a week or ten days.

Onanie as a Cause of Vulvitis.—There may be a lengthening of the small labia and the clitoris, a condition to which Dickinson has called attention, but this is not always present. The sebaceous glands on the inner surface of the small labia and on the vestibule are increased in size, so that the inner surface becomes uneven and looks as if it were covered with file-like elevations. There is often an increased discharge of mucus from the glands of Bartholin, and huge amounts from the cervix. At times the vulva has a very red, congested look.

An acute inflammatory vulvitis, really constituting a vulvovaginitis, occurs in children as a diphtheritic inflammation in diphtheria, and more frequently as an eruptive, ulcerative, or necrotic condition in the infectious diseases of children, such as scarlatina, measles, etc. A gonorrheal vulvitis in children is by no means infrequent, producing, in addition to burning and itching, few annoying symptoms. It is only part of a gonorrheal vulvovaginitis. A real vulvitis occurs in adults as a result of, or in combination with, inflammations of the urethra, of the vagina, of the cervix, usually gonorrheal. In addition, the vulva may undergo marked chemical or bacterial irritation from the secretions of a degenerating or necrotic carcinoma or myoma of the cervix or uterus, or from the urine associated with a cystitis or discharged from a fistula.

A catarrhal vulvitis is an inflammatory affection of the mucous

membrane on the inner surface of the labia majora and the labia minora, on the clitoris, and in the vestibule up to the hymen. With it are often combined inflammations of the urethra, of the ducts of Bartholin, of Skene's glands, *i. e.*, of the mucous membrane canals which open into the vestibule. In acute infectious cases the diagnosis is made by inspection. The labia majora and minora are swollen. Touching the parts causes contraction of the constrictor cunni or vaginismus. The mucous membrane is diffusely red, especially at the introitus. The mucous membrane bleeds readily on mechanical irritation. In acute cases the secretion is purulent and mixed with the tenacious mucus of the glands of Bartholin. Purulent discharge from the urethra, punctate redness of the vulva, involvement of the glands of Bartholin, involvement of the periurethral glands, small red hypertrophies of the mucous membrane, speak clearly for the existence of a gonorrheal cause. With inflammations of the vulva ulcerations may occur. They are situated especially in the fossa navicularis, at the edge of the hymen, and in the circumference of the external meatus of the urethra.

In chronic vulvitis there is little or no discharge. There are only masses of squamous epithelium. Sometimes a milky or purulent secretion can be expressed from the recesses and folds of the vulvar mucosa. In other chronic cases the mucous membrane is not so red, but evidences red spots and streaks at the border of the hymen, about the urethral orifice, on the outer surface of the hymen, and about the ducts of Bartholin. In still other cases there is little visible change resulting. Little remains of the original condition except evidences of the scratching, due to the itching.

Vulvitis pruriginosa is often classed as a form of pruritus vulvæ. Pruritus vulvæ is generally a secondary condition and attention must be paid to the cause. Among the causes are icterus, diabetes, irritating discharge from the vagina, cervix, or uterus, masturbation and endometritis with irritating fluor, and, in addition, the irritation of ammoniacal or pathologic urine. But there occurs in older women, at the climacterium, a condition which is really a chronic inflammation without any evident cause. Vulvitis pruriginosa is such a chronic inflammation of the vulvar mucosa in older women, with marked symptom of burning and itching. The mucous membrane and the surrounding skin are markedly inelastic

and furrowed into folds, especially about the clitoris. It has a bluish-gray color, sometimes very pale, in contrast to the surrounding mucous membrane. Its main symptom is burning and itching, which are most markedly felt at night in bed. Scratching can scarcely be resisted, and there result excoriations and eczematous conditions. This form is not infrequently one-sided. It is to be distinguished from kraurosis vulvæ.

Kraurosis Vulvæ.—This is an atrophic condition of the corium of the mucous membrane of the larger and the smaller labia and of the introitus. There first appear white spots on the surface of the mucous membrane, which later take on a sclerotic character. The mucous membrane becomes white, grayish, and atrophic; gradually the smaller labia and the clitoris shrink. The larger labia appear flat and the smaller labia seem almost absent. The clitoris is small and lies concealed under folds of atrophic mucous membrane. Pruritus is the only subjective symptom. Narrowing of the introitus results. It differs from vulvitis pruriginosa in two important respects: (1) There is a decided narrowing of the introitus; (2) the atrophic condition of the skin is marked. This is in contrast to the inelasticity and folded character of the skin in vulvitis pruriginosa.

Diabetic Vulvitis.—This condition, which occurs in connection with diabetes and has itching for its marked symptom, is, as a rule, so typical in appearance that the diagnosis can be readily made. The entire skin covering of the larger labia and the smaller labia, the clitoris, and the vulva have a bronze or copper-colored leathery look and feel. These tissues are thickened but do not pit on pressure and they are elastic in character. Occasionally the condition is one of furunculosis. In every case of vulvitis the urine should be examined for sugar.

THE TREATMENT OF VULVITIS

In the treatment of catarrhal vulvitis the usually associated urethritis and vaginitis, etc., should be treated. For the vulvitis itself, local applications of dilute liquor plumbi subacetatis, or a solution of acetate of aluminum, give relief. After the acuteness is over, local painting with 5 to 20 per cent. solution of nitrate of

silver or the application of a 5 per cent. cocain salve is advisable. Cases beginning as intertrigo in fat women should be treated by a thorough washing with soap, followed by bichlorid solutions; then salve should be applied, either zinc ointment or 10 per cent. bismuth subnitrate in oxid of zinc, or the area should be painted with 10 per cent. silver.

When first seen, the vulva in inflammatory vulvitis should be thoroughly washed with glycerin soap and water, making use of cotton sponges. The treatment of vulvitis demands absolute cleanliness and the correction of the cause. If it is secondary to conditions existing in the urethra, bladder, vagina, cervix, or uterus, these affections must be treated. In addition to the preliminary washing, the vulvitis itself is benefited markedly by warm sitz-baths taken twice daily for periods of fifteen minutes. Shaving of the hairy parts of the skin area involved is of great value. Twice daily douches should be taken, consisting of 1 dram of acetate of aluminum to 2 quarts of water.

Acute gonorrheal vulvitis should be treated by cleansing of the external structures. Mild solutions of corrosive sublimate 1 : 5000 to 1 : 10,000 should be used. The parts should be carefully separated and gently sponged with cotton soaked in this solution, each washing being followed by a vaginal douche of bichlorid of mercury 1 : 2000. Bichlorid gauze should then be placed in such a manner that the two sides of the vulva should be kept apart by a T binder gently applied. The patient should be kept in bed and sedatives should be administered four times a day. If the skin is sensitive and red and is irritated by the action of the bichlorid of mercury, the gauze dressing should be saturated with a solution of acetate of aluminum. In the subacute stage the vulva should be treated by the silver salts. It should be painted with argyrol 25 per cent., by nitrate of silver 10 per cent., and the surfaces should be kept dry by gauze dusted with dermatol and nosophen.

Some of the cases are benefited if the two halves of the vulva are kept apart by gauze saturated with a 1 per cent. solution of acetate of aluminum. In other cases relief is obtained by saturating the gauze with a dilute solution of acetate of lead or a watery solution of 1 to 5 per cent. carbolic. When the acute stage is over, the

solution should be changed to 1 per cent. alum and the vulva should be painted with 15 to 10 per cent. nitrate of silver.

In the treatment of chronic vulvitis attention should be paid to the area immediately around the external opening of the urethra. Any resisting inflammation about the urethra or a folliculitis of the same area must be treated by the actual cautery or by the nitrate of silver stick preceded by the use of cocain.

Some of the cases do well on the application of salves. A 10 per cent. ointment of bismuth subnitrate in a base of oxid of zinc or a 2 per cent. carbolic ointment is of value. Salves include a 10 per cent. calomel ointment; 5 to 10 per cent. cocain salve (cocain, 1 dram; lanolin, 1 ounce; olive oil, 2 drams) or menthol ointment (menthol, ½ dram; olive oil, 2 drams; lanolin, 1 ounce); a carbolic ointment, containing 15 grains of carbolic acid to 1 ounce of unguentum zinci oxidi; a 10 per cent. ointment of anesthesin. If this does not give relief, the parts should be kept dry by dusting-powders. In mild cases a powder composed of equal parts of oxid of zinc and starch is sufficient. A better powder is one containing 20 grains of salicylic acid to a half ounce each of oxid of zinc and starch. A very good powder consists of menthol 15 grains, salicylic acid 1 dram, oxid of zinc 2 drams, amylum and talcum 5 drams. In the more stubborn cases the vulva must be painted with 10 to 20 per cent. solution of nitrate of silver.

The treatment of vulvitis pruriginosa, of kraurosis vulvæ, of diabetic vulvitis, and of the skin annoyances is given in the section on Pruritus Vulvæ.

COLPITIS OR VAGINITIS

Etiology.—Newly born children by no means rarely acquire gonorrheal vulvovaginitis of various degrees of severity. Older children quite frequently suffer from gonorrheal vulvovaginitis. This condition is generally considered to be simply a vulvitis, when practically in every case, especially those cases which do not yield very quickly to treatment, the associated vaginitis is the important condition.

Diphtheria rarely, but much more frequently measles and scarlatina, may produce an acute involvement in the vagina of an eruptive, ulcerative, or hemorrhagic character, often unrecognized; and when noted, because of the bleeding, considered to be a precocious menstruation.

In adults acute structural primary involvement of the vagina by the frequently inoculated gonococcus is not so easy. The thick squamous epithelium is much more resistant to the gonococcus than in children, with their tender, thin, vaginal epithelium, yet this involvement may take place primarily. Vaginitis is frequently secondary to involvements of the cervix and uterus by gonorrhea and catarrhal inflammations. Of course, all infecting bacteria must pass through the vagina before reaching the cervix and uterus, where they find a more favorable soil. In the vagina there comes into play the element of continued irritation. A secretion from the cervix and uterus, produced by any cause, such as gonorrheal or other infection, or by degenerating carcinoma or myoma, is constantly poured into the vagina, macerates the vaginal epithelium, and produces mechanical and chemical irritation and subsequent bacterial inflammation.

Contributing Causes of Colpitis or Vaginitis.—The use of unclean pessaries, the presence of neglected tampons, injury to the vaginal mucosa from the pressure of pessaries, etc., may permit introduced bacteria or the various forms of bacteria present in the vagina to add the element of inflammation to the element of mechanical irritation.

Infection of the vagina from the rectum by the bacterium coli or by saprophytes may occur in older women with lacerated perineums and non-resistant tissues. Prolapse of the vagina or cystocele in older women permits of irritation of the exposed vaginal mucous membrane, in addition to the natural tendency to senile vaginitis in that period.

Vaginitis or colpitis is a catarrhal inflammation of the mucous lining of the vagina from the hymen up to the external os. Colpitis must be distinguished from hypersecretion.

Hypersecretion occurs in pregnancy and with inflammations, exudates, and tumors situated near the vagina. It may also occur with chlorosis, with anemia, with the irritation of intercourse, and with onanie. Such secretion is pure white. All purely white secretions contain squamous epithelia. Serous discharge may come from the vagina. A milky serous secretion is characteristic of the vagina as a result of the serum which is thrown off from the capillaries of the papillæ. Such a secretion results from an increased throwing off of squamous epithelium which forms white masses often accumulated on the surface of the mucosa as thick white particles. When these are removed, the character of the mucosa underneath is seen.

Acute Colpitis.—Colpitis is recognized with the aid of the Ferguson speculum: (1) By the character of the vaginal secretion; (2) by changes in the mucous membrane. With acute infections there is a production of pus and the secretion takes on a touch of yellow. The more acute the process, the yellower and more purulent is the discharge. Pus is greatest in the granular colpitis of gonorrheal origin, especially so in pregnancy. Purulent secretion is not characteristic of the vagina alone, but may come from the uterus. The appearance of the vagina, however, generally shows whether the vagina is involved. Whenever there is doubt as to the source of the purulent secretion, a long vaginal cotton-gauze tampon should be used (Fig. 50). In colpitis the tampon becomes soaked with discharge and that part of the tampon which is in contact with the vagina is covered with pus. In the punctate form of colpitis the tampon shows a yellow spot corresponding to every involved point.

In acute cases the mucous membrane is diffusely red. There is also, in addition to the diffuse redness, a spotted or streaky

hyperemia, due to a very strong injection of the papillary bodies of the mucous membrane. We see in the upper part of the vagina, red, ink-like spots, or red streaks, which represent the summit of the vaginal folds. The spots bleed easily and there are sometimes ecchymoses. With intensive inflammation the papillary bodies of the vaginal mucosa swell and the vaginal folds and papillæ project above the surface of the mucosa. This is especially marked in the gonorrhea of pregnancy, and there results what is called a colpitis granularis.

In secondary colpitis, resulting from an infectious cervico-uterine catarrh, the discoloration of the vagina is most marked or often limited to the posterior wall of the vagina near the external os.

Chronic Vaginitis.—If chronic hypertrophic conditions supervene in the inflamed papillæ, there may result condylomata acuminata, which are small excrescences with a white irregular surface which occur singly in the vagina or on the portio. In the mild or chronic forms of colpitis there may be varying degrees of milky or serous discharge. When this is removed, the red mucosa is seen underneath. In the mild or chronic forms of colpitis tiny red spots may be the only signs observed.

Senile Vaginitis.—Spots and ecchymoses are most distinct in senile women, because of the thinned-out character of the vaginal squamous epithelium. Vaginitis senilis occurs frequently at the climacteric period and represents regressive changes in the mucous membrane, which becomes non-resistant to vaginal bacteria. There may be a diffuse redness of the mucosa, which is especially marked in the exposed mucosa if cystocele is present. There may, on the other hand, be erosion of the surface. The papillæ are not prominent. There may result adhesions of the upper and lower vaginal walls or even atresia of the entire canal. These adhesions yield readily to pressure and are followed by a little bleeding.

Colpitis Mycotica.—This condition may occur, especially in pregnancy, and is due to the leptothrix vaginalis or to the oidium albicans. The latter may cause an appearance simulating colpitis with epithelial desquamation. It occurs most frequently in pregnancy and forms white spots, generally at the summit of the vaginal folds. These are not easily wiped off, and when removed uncover red inflamed areas which bleed readily. Microscopic examination

in diluted potassium hydroxid solution sometimes shows only squamous epithelium, but often reveals the mycelium oidium albicans.

Colpitis Emphysematosa.—In pregnancy especially there may occur the formation of gas vesicles in the mucosa, generally situated on the posterior wall, due to the activity of gas-producing bacteria and called colpitis emphysematosa.

In colpitis there may occasionally occur an exfoliation of part of the mucous membrane. This occurs, as a rule, after the application of drugs, such as several coats of iodin. Microscopic examination distinguishes this membrane from intrauterine exfoliations, with which it may be confused.

DIAGNOSIS

The symptoms of an acute colpitis are local heat, a sensation of burning, and pressure. Coitus is painful. There is usually an associated vulvitis which causes burning with intertrigo. In the acute cases these symptoms are generally in the background because of the severity of the associated external or higher infections. In children the symptoms are those of vulvitis. Even in gonorrheal vulvitis, with the exception of some burning and irritation, the annoyance felt by the little patients is very slight.

In colpitis the examining finger may feel the rough character of the vagina, due to the projections on the transverse folds of the vagina. When infiltration takes place on the transverse folds or in the papillæ, the vagina feels like a file to the examining finger. When there is diffuse redness, the vagina may feel as smooth as moss. In other cases the finger simply notes the heat of inflammation. In the mild forms of colpitis, associated with epithelial desquamation, the examining finger notes the dried particles which cover the entire vaginal mucosa. Often the finger notes nothing, especially in the senile vaginitis, because in them the papillæ are not prominent. The symptom of chronic colpitis is simply fluor albus. Senile vaginitis, which is often combined with cystocele, results in itching and burning and some bleeding on examination or on the use of rings. The diagnosis of colpitis is

to be made by the finger, but especially with the eye and microscope.

TREATMENT OF VAGINITIS

The vaginitis associated with acute infectious diseases should be treated by daily douches of 1 per cent. carbolic acid.

In acute vaginitis the patient should have rest in bed, the external genitalia should be thoroughly cleansed, tepid sitz-baths should be taken daily. Alternate tepid douches of bichlorid of mercury, 1:2000, and acetate of aluminum, 1 dram to 2 quarts, should be given four times daily, and gauze soaked in 1:5000 bichlorid or in 1 per cent. acetate of aluminum should be applied to the perineum and vulva. If the irritation is marked and if the treatment of the vaginitis demands sedative and antiseptic douches, thymol 1:1000, permanganate of potash 1:1000, and ½ per cent. ichthyol should be substituted for the bichlorid. In addition to the above solutions, acetate of lead is of value in the strength of 1 to 2 per cent., or Lugol's solution 1 to 2 drams to the quart, or pyroligneous acid 1 to 4 drams to the quart. Internally bromids and opium should be administered. When the primary inflammation and sensitiveness is diminished, hot douches of bichlorid of mercury or 1 to 2 per cent. carbolic acid are of value. In the case of sensitive vagina, ointments containing carbolic acid 1 per cent. or ichthyol 5 per cent. may be used at first. If the vagina is not too sensitive, it should be washed with the aid of a Ferguson speculum with sponges soaked in a carbolic solution, and gauze soaked in 1 to 5 per cent. protargol should be introduced into the vagina and left in place for several hours. Still later the vagina should be bathed, with the aid of a Ferguson speculum, by solutions of nitrate of silver 1 per cent., and the vagina should be gently packed with sterile gauze or iodoform gauze left in place for twenty-four hours. Then irrigate daily with alum 2 per cent. or permanganate of potash 1:1000. In the chronic persisting forms of vaginitis the Ferguson speculum should be used and nitrate of silver should be applied in stronger solutions.

In very chronic cases if silver, 1 per cent. or stronger, fails, paint vagina every two or three days with tincture of iodin or silver 5 to 10 per cent., pack the vagina with gauze, and continue the treatment till vaginal epithelium desquamates. Hot douches should then con-

sist of tannic acid, sulphate of zinc, or alum 1 dram to the quart. Splendid results are to be had by bathing the vagina, with the aid of the Ferguson speculum, with bichlorid of mercury 1 : 100, rendered acid by a few drops of hydrochloric acid. Then pack with iodoform gauze or gauze dusted with dermatol, and repeat twice a week. In the meantime irrigate with 1 : 5000 to 1 : 2000 bichlorid or with tannic acid, sulphate of zinc, or alum. This treatment is effective in hypersecretion, especially if associated with endocervicitis and fibrosis uteri. Nitrate of silver solutions exert an astringent influence when applied with the aid of the Ferguson speculum. Iron and tonics should be given for anemia. Pelvic congestion should be relieved by sitz-baths and the uterus should be supported by intravaginal pressure therapy, and later on by a pessary. (See pages 99, 105, 119, and the sections on Leukorrhea and on Gonorrhea.)

In that chronic form known as colpitis granulosa, first clean the vagina with the aid of the Ferguson speculum and then use pyroligneous acid in the Ferguson speculum, rubbing it well into the vaginal mucosa with cotton on a swab. This should be done two or three times a week.

Senile Vaginitis.—Bathe the vaginal walls thoroughly with pyroligneous acid three times a week for several weeks through the Ferguson speculum. Daily douches of pyroligneous acid, 1 to 3 drams to the quart, are to be ordered. No pessary is to be worn.

For colpitis mycotica 1 per cent. corrosive sublimate or three per cent. carbolic should be applied with the aid of the Ferguson speculum.

ENDOCERVICITIS OR CERVICAL CATARRH

Etiology.—An inflammation in the genital tract may be produced by tubercle bacilli which may reach this focus of development through the medium of the circulation. The tubercle bacillus, as a rule, however, enters the genital tract subsequent to its presence in the peritoneal cavity, being then attracted by the ciliated epithelium into the tubes or uterus. Appendicitis with its exciting streptococci, staphylococci, or bacterium coli may, as a consequence of the resulting peritoneal exudation, likewise send its bacteria or cocci into the follicles of the ovary, or else into the tubes and uterus, through the action of the ciliated epithelium in their lining. The diseases of children, such as measles, scarlatina, mumps, etc., are known to produce, not so very rarely, unrecognized inflammation in the ovaries, tubes, or uterus, with resulting temporary or permanent structural and functional involvement of these organs. Scarlatina, diphtheria, measles, etc., may produce acute invasions of the uterus or necrotic lesion in the cervix or vagina with resulting annoyances in the way of stenosis and atresia. With these exceptions the bacteria which produce infection of the genital tract must first pass through the cervix. It is therefore of importance to study the cervix and its infections, and in addition to note the various lesions which may follow as sequelæ from this primary point of involvement.

Infection of the cervix in labor, in abortion, or in operations on the cervix and uterus may lead to various inflammations, such as endocervicitis, endometritis, metritis, salpingitis, oöphoritis, peritonitis, true septicemia, pyemia, phlebitis, and local involvement of the cellular connective tissue of the pelvis. Frequently we find an exudative or purulent involvement of one or both broad ligaments, due to infection through lateral tears of the cervix, or else we find an inflammatory accumulation in the posterior parametrium or in the uterosacral ligaments. Any or all of these conditions may be due to infection during labor, abortion, or operations on the

cervix, and are of not infrequent occurrence. It must be remembered that previously present or introduced streptococci and staphylococci, or sometimes the bacterium coli, are frequently the agents which produce those pathologic conditions as well as the localized abscess formations in the cellular connective tissue. When the inflammation subsides, with or without operation, these infecting cocci and bacteria have a tendency to disappear, although they may continue in the uterus and cervix and though structural alterations may remain. If, as so often happens, the gonococcus be present before labor, abortion, or operation, it may then produce or take part in any of the above-mentioned affections, but the gonococcus does not subsequently disappear so readily. Conditions which produce congestion in the genital tract seem to favor the continuance of the growth of bacteria. For instance, the gonococci may be found by careful examination after menstruation in the secretion of the cervix and uterus when not found at other times. Excessive coitus may keep up or stimulate any of the inflammations present in the genital tract. Exertion, work, and lifting have the same influence. In gonorrhea, especially in the older cases, the staphylococcus is often found playing a part in keeping up the chronic lesions. In such instances the gonococcus may disappear, at least so far as microscopic evidences are concerned. It is well known that in pyosalpinx after a certain period the gonococci disappear, and either streptococci or staphylococci are found or else the pus is perfectly sterile. That the cervix then may contain various forms of bacteria, or that they may enter the cervix from the vagina in abortions, labors, operations, etc., is certainly true in many cases.

Leaving aside the discussion of affections that occur under the conditions of labor, abortion, or operations, and dealing with acute, subacute, or chronic involvements of the cervix under other circumstances, we are forced to the conclusion that the latter involvements are due in the very vast majority of cases to the presence and development of the gonococcus.

In the female various forms of bacteria are present in the vulva. In the urethra streptococci, staphylococci, and bacterium coli are frequently present and may be introduced into the genital tract. The normal vaginal secretion has an acid reaction and contains

epithelial cells, various forms of bacilli, and yeasts and cocci. The normal vaginal secretion and the normal resistance of the squamous epithelium have the power, as a rule, to resist the invasion of various micro-organisms introduced from the vulva or by coitus or by examination. This resistance varies in different individuals and in different periods of life. A pathologic secretion contains leukocytes in addition to the squamous epithelia and various forms of bacteria, among which may be streptococci and staphylococci and gonococci. In older women and in senile women bacteria and cocci other than the usual ones may be present in the vagina and also in the cervix and uterus. When once the genital tract is the seat of a gonorrheal infection, however, the various pathogenic organisms which are usually destroyed when introduced into the vagina find opportunity for existence not alone in the vagina but also in the cervix and possibly in the uterus. Normally the upper part of the cervix and the uterus contain no bacteria, but when gonorrhea has once invaded the cervix and uterus conditions are altered.

Infections of the cervix very frequently occur in nulliparæ under circumstances not related to labor, abortion, or operation. Normally the upper part of the cervix and the uterus contain no bacteria. The cocci and other micro-organisms which usually enter the vagina through lack of cleanliness or through the physical relation of coitus are destroyed by the resistance power of the vagina. When, however, through the male urethra, a pathologic seminal or prostatic secretion is continually being deposited in the fornices, the ability of the vagina to rid itself of micro-organisms is not absolute, nor does it protect the cervix and its lining. The pathologic seminal or prostatic secretion may contain gonococci or streptococci or staphylococci, and in very rare instances tubercle bacilli. A chronic prostatitis originally gonorrheal may be complicated by the presence of pus cocci, complicating the original disease either as a mixed infection or as a secondary infection. That some cases of cervical involvement may thus result from streptococci or staphylococci, is quite probable. While the gonococcus may play an important acute rôle in the production of mucous membrane, subepithelial, peritoneal, and systemic involvements, with or without relation to pregnancy and the puerperium, yet the

gonococcus most frequently plays a subacute and generally unrecognized rôle in the production of chronic, stubborn, or permanent affections of the mucous membranes, the myometrium, the peritoneum, or the pelvic cellular connective tissue. The point of primary infection in these conditions is the cervix. Hence, in addition to being the original focus in the production of many acute inflammations, the cervix plays a most important part as a portal of infection in the transmission of those subacute and chronic inflammations in the female, which even today are so little understood.

When a male suffers from gonorrhea, there is a purulent discharge, burning micturition, pain, and many complicating troubles and dangers so soon as the inflammation passes to the posterior urethra. (The gonococci are most readily found.) Light cases are such as heal in a few weeks and do not extend to the posterior urethra. They heal quickly because the infecting gonococci are not virulent, or because the individual is not particularly susceptible and because the condition is limited to the anterior urethra. In women, too, infection by the gonococcus may begin with virulent acuteness in the cervix, yet patients may not seek medical aid unless the urethra or glands of Bartholin are affected, or unless the uterus or tubes and peritoneum are involved by a virulent rapid upward extension, which upward extension may occur in spite of great care, but which is often furthered by pelvic congestion, overexertion, intracervical or intrauterine manipulation.

In virulent cases of gonococcus infection in women, when the activity of the inflammation is entirely or superlatively carried on in the uterus, tubes, connective tissue, or peritoneum, the cervical affection for the time being is a negligible quantity. The evidence of inflammation in the cervix is then scarcely needed as an aid to diagnosis. After the acuteness of the associated complications has disappeared the cervical condition may furnish corroborative evidence, yet the other lesions enable us to make the diagnosis.

Acute Endocervicitis.—When, however, an acute endocervicitis, in the discharge from which gonococci can be readily found, remains limited to the cervix alone, it causes relatively few symptoms. The cervix looks shiny, it is somewhat sensitive to pressure, there is a mucopurulent discharge, there is a red inflamed area

about the external os, and gonococci can be readily found in the pus cells. We rarely see such localized cases early because the symptoms, when the disease is located in the cervix alone, are very few.

When such acute cervix cases to come to hand, some come perhaps of a complicating urethritis and painful burning micturition, yet many women having a gonorrheal urethritis bear with the associated annoyances, which gradually become less and either continue as a subacute process or finally heal without attention on the part of a physician. Other patients come because of a complicating Bartholinitis with gonococci in the secretion, which is only accidentally discovered, as the duct is not closed and an abscess in the gland is not found. It is the external complications which bring such patients to the physician, and it is then that an acute localized endocervicitis is usually brought to light. Such cases located in the cervix may pass on, of themselves or by conservative treatment, to the subacute or chronic form.

It is to be remarked that cases of virulent involvement of the uterus show slight evidences in the cervix. There is little mucus and cervical discharge. It seems as if in such cases the cervix in its reaction to the gonococcus invasion showed but little resistance, because it was stimulated to the secretion of but little mucus, and thus infection was permitted to spread readily upward. In those cases with the greatest catarrhal involvement of the cervix the cervix has reacted to the gonococcus invasion by the production of much mucus, and upward extension is either prevented or is made of a very mild character. Then we find the changes which give us the picture of chronic catarrh with discharge, erosions, inflammatory ectropion, etc., yet examination at this later stage divulges gonococci only after great care or after a recrudescence, and most often not at all.

Subacute Endocervicitis.—Most cases of cervical infection, however, are innocently acquired from a supposedly cured or supposedly harmless prostatitis in the male, and they naturally begin in a subacute form. (The rule of Wertheim does by no means always apply.) It is in the subacute cases that close study of the cervix plays a most important part in furnishing the local evidences of the existence of an inflammation which, perhaps, has

been slowly extending into the genital tract. There is nothing to suggest a marked involvement, or there is nothing to suggest gonorrhea as it is generally pictured. Examination by microscope shows no gonococci and often few pus cells. If the inflammation extends upward slowly to the uterus or tubes, such subacute cases seek medical aid because of sterility or because of pain due to involvement of the peritoneum or to involvement of the cellular connective tissue. These extensions often come on after intrauterine manipulation or after labor or abortion, which latter condition is of itself so often due to a mild uterine catarrh and the consequent endometrial and decidual changes. Though no bacterial infection can occur in the uterus from below without first passing the cervix, yet in many cases distinct evidences in the cervix are lacking. In many cases where the condition has extended higher up, very slight evidences are present in the cervix, and the diagnosis must be made from the presence of even the slightest accessory lesions in the genital tract. In other instances the entire condition is limited to the cervix at the time of examination. Especially here, recognition of the existence of an infection in the cervix is important: (1) Because the cervix furnishes the original focus; (2) because from this focus pass out the inflammatory elements which continually infect the connective tissue about the uterus; (3) because we thus obtain corroborative proof of the existence of an inflammation which may have passed higher up without any elements of acuteness and without causing any pain whatsoever. If the higher parts are markedly affected, they dominate the situation. If the cervix alone is affected, its conservative treatment is of doubly great importance. By proper care we may avoid that upward extension which yields negative symptoms in the form of sterility, or positive symptoms in the form of pain. Sterility due to salpingitis, and yet unassociated with pain, is often a symptom, and we must look for evidences of a causal inflammation. This cause is generally a cervical catarrh produced by the secretion of a chronic prostatitis.

Evidences of Cervical Catarrh.—What are the evidences of cervical catarrhal inflammation?

Normal Cervix.—The normal cervix is covered by smooth vaginal, squamous mucosa. The wall is composed of muscle

fibers; its canal is lined with high cylindric ciliated epithelium which secretes mucus of a clear, glairy nature. The external os marks off a fairly clear line of division between the squamous epithelium of the outer covering and the cylindric epithelium of the canal. The line of delimitation is generally as sharp as that observed between the skin and mucous membrane of the lips. The cervix is not hard and the area of the internal os, except in some cases of congenital retroversion and elongatio colli, presents an elastic line of division between the cervix and fundus. The cervical portion of the uterus is embedded in connective tissue, and six ligaments filled with connective tissue and rich in lymphatics are connected with the cervix—the two broad ligaments, the two uterovesical ligaments, the two uterosacral ligaments. These, with the connective tissues about the cervix and the subperitoneal connective tissue which lines the pelvis, constitute the parametrium or pelvic cellular connective tissue. The cervix is freely movable and no sensitive points or infiltrations are felt about it. The normal cervix may be pushed up toward the symphysis, pushed back toward the sacrum, pushed toward the lateral wall of the pelvis, without pain and without limitation of mobility.

Variations from the Normal.—We may study the variations from the normal which are produced by mild or chronic cervical infection by observing: (1) changes in the squamous mucosa covering the cervix; (2) changes in the area of delimitation between the cervical lining and the squamous covering of the cervix; (3) changes in the cervical lining; (4) changes in the surrounding connective tissues; (5) changes in the cervical wall. Other higher lesions in the genital tract pass out from this original focus of inflammation and present negative or subjective symptoms, as well as tangible lesions.

We are therefore concerned (1) with objective evidences, (2) with subjective evidences or symptoms.

Objective Evidences.—Under objective evidences we have: (1) changes in the squamous covering of the cervix in the form of erosions; (2) redness and signs of inflammation about the external os; protrusions of the cervical lining; inflammatory ectropion; (3) changes in the cervical lining produced by catarrh, which are evidenced by swelling of the mucous membrane and by the existence

of a pathologic discharge; (4) changes in the connective tissue in the form of parametritis; (5) changes in the cervical wall in the form of ovula of Naboth or of diffuse hypertrophy; (6) overgrowths of cervical mucosa in the form of polyps.

The Vaginal Form of Cervical Catarrh.—The vaginal portion of the cervix is covered with stratified squamous epithelium, under which are but few papillæ. The lowest layer of cells, the layer which separates the squamous epithelium from the connective tissue, is composed of low cylindric cells and is the so-called formative layer or stratum germinativum. The tissue under this epithelium is connective tissue rich in nuclei. The deeper layers are formed of muscular tissue radiating from the corpus uteri and forming the main structure of the cervix. Inflammation of the cervix is of either the vaginal or the cervical type. The former means inflammation of the outer covering of the cervix, and is part of a vaginitis. In the vaginal form we observe redness or red isolated points or papillary areas, like those observed in vaginitis. Such factors, except in old women, speak for a gonorrheal etiology. In inflammation of the vaginal portion of the cervix the capillaries are turgid. New capillaries are formed under the surface and there is a grouping of round cells, especially around the new capillaries. Numerous papillæ are formed which pass up to the surface and are supplied with turgid capillaries, thus giving the red color to the surface.

The Cervical Form.—The second type may be called the cervical form, in which erosions are often present in conjunction with and due to a cervical catarrh. When smooth vaginal mucous membrane does not cover the entire surface of the vaginal portion of the non-lacerated cervix, but suddenly ceases, giving place to smaller or larger very red, uneven, and slightly bleeding spots, we are concerned with a pathologic state. This affection is generally situated immediately around the external os in its entire circumference. The red base is either depressed or else rises above the surface in the form of excrescences. Because of the external appearance, these lesions are called *erosions*. They must be distinguished from inflammation of the vaginal portion, from ulcers, and from ectropion.

Erosions mean that the vaginal part of the cervix which is

normally covered by squamous epithelium evidences in the circumference of the external os the presence of cylindric epithelium to varying extents. Cylindric epithelium grows out from the cervical lining and takes the place of destroyed squamous epithelium. (1) In place of squamous epithelium we may have cylindric epithelium with a few glandular structures in the stroma. This is known as a *simple erosion.* (2) If the cylindric epithelium passes deep into the stroma and then rises again, etc., a papillary appearance is given and we have what are called *papillary erosions.* (3) If the surface is smoother, but glandular dilatations are present among epithelial depressions, we have what is known as *follicular erosions.*

In the early stages the stroma shows a small-celled infiltration. Therefore, in erosions, in place of the vaginal mucous membrane of the vaginal portion of the cervix and in a stroma normally free of glands, cervical epithelial cells with glands are present, showing, however, productive inflammatory changes. The theories which account for the origin of erosion are as follows:

Theories as to the Origin of the Erosions.—(1) The theory of Fischel: In the newly born, he says, the outer surface of the vaginal covering of the cervix is of cervical structure. Either this infantile habitus persists, or else squamous epithelium later makes its way over these areas and grows over the cylindric epithelium. When later on *irritation occurs,* it stimulates these once buried cylindric cells to growth and they appear on the surface.

(2) The theory of Ruge and Veit: They say that the cylindric surface epithelium with the depressions into the stroma originates from the formative layer and stratum germinativum of the squamous epithelium. The upper layers of the vaginal cervical covering are thrown off in erosions and the formative layer remains as an independent covering in the form of cylindric epithelium.

(3) Abel asks why this lowest layer, which usually forms only squamous epithelium, should suddenly form cylindric epithelium. Fischel's theory explains some cases when the erosions are situated at a distance from the external os or form isolated islands. Abel says that an irritation causes the cervical epithelium to proliferate, and that this growth displaces the squamous epithelium. In most cases cervical catarrh is present.

I hold that the continued discharge of a cervical catarrh macerates the squamous epithelium, which is thrown off, and replaced by the cervical epithelium engaged in proliferation. This new epithelium then produces glands here, just as it normally does in the cervix. Whichever of the theories be correct, erosions are an evidence of an inflammatory catarrh in the cervical canal.

The Meaning of Erosions in Nulliparæ.—In nulliparæ especially, the presence of erosions speaks for a gonorrheal catarrh of the cervix. In women who have borne one or more children, and in whom perhaps other bacilli or bacteria may have been introduced, it is possible that a catarrh causing erosions may have other than a gonorrheal etiology. In women who have borne many children and in whom hypertrophy of the cervix is marked, and in whom lateral tears are slight, we may observe the area of the external os to have a somewhat red look and to be covered with many very small hard follicles. The cervical canal is roomy. There is secreted a clear tenacious mucus. Posterior parametritis chronica is never marked. Nothing suggests the degree or intensity of irritation observed in erosions or in inflammatory ectropion. It is conceivable, in fact, it probably happens often enough, that a cervical catarrh may go on to relative healing. Dilatation of the cervix by labor, the ironing out of the cervical recesses, and hypertrophy of the cervix give good ready drainage to the canal. Successive pregnancies are followed by further dilatation and hypertrophy, and the final picture is by no means like that observed in sterile nulliparæ, in whom, in all probability, cervical catarrh by upward extension has rendered pregnancy improbable. Many of such cases in multiparæ have been originally gonorrheal.

In older women and in women at the menopause new changes may take place about the cervix, if laceration exists, which partake of the nature of the changes occurring in the vagina—senile vaginitis. The longitudinal folds of the cervical mucous membrane may give the external os a furrowed pinkish look, but hypertrophy and infiltration are absent.

Redness and Signs of Inflammation About the External Os.—Though the point of junction of the squamous epithelium of the portio with the cylindric epithelium of the cervical canal is not always a certain one, yet the point of transition can be macroscopi-

cally recognized. In the presence of an inflammation we observe sometimes a tiny ring of glazy redness and edema around the external os in nulliparæ. This symptom, though slight, is of very great importance. In other cases this margin of redness is a little wider and its edge is not regular, but looks frayed. This is probably due to the longitudinal folds present in the cervical canal. In other cases in nulliparæ or in women with non-lacerated cervices there is a slight protrusion of red inflamed mucous membrane on the anterior lip and the posterior lip just within the external os. There may be much secretion within the cervix of a very thick, extremely tenacious, white mucus. With this red glazed area of redness about the external os, however, little secretion is generally noted. The Schultze tampon must be used. In the case of nulliparæ without lacerations the external os is dilated, the cervix is somewhat hypertrophic and edematous, and the slightly everted mucous membrane looks red and irritated and shows all the evidences of inflammation.

Ectropion.—The lining of the cervix is composed of cylindric ciliated epithelium which forms depressions in the shape of the well-known cervical glands. The cervical lining is arranged in longitudinal folds, beginning at the internal os and forming the arbor vitæ or plicæ palmatæ.

The epithelial cells are long, with transparent protoplasm, and are narrower at the base and have their nucleus at the base. The stroma of the cervical lining is, in addition, rich in cells only directly under the cervical epithelium, for the main element of the cervical wall is composed of muscle fibers into which project the base of the glands.

Ectropion means that the mucous lining of the cervical canal, in lateral lacerations of the cervix, has been everted. The everted mucous membrane shows to the eye the state of the cervical canal. If no catarrhal infection is present, the exposed cervical lining undergoes epidermoid changes and looks like squamous epithelium. With catarrhal inflammation we get a red, inflamed looking area which is known as inflammatory ectropion.

Secretion.—The normal secretion of the cervix is a glairy, tenacious, clear mucus, ofttimes large in amount, in which event we are dealing with hypersecretion. This is often the result of con-

gestion and not infrequently of onanie. When, however, an infection is present, the secretion is increased in amount and in character. It becomes either white or generally grayish, but may be yellow or green, showing variations in proportion to the acuteness or virulence of the infection. In every case the amount and character of the cervical discharge should be noted. The vagina and outer cervix should be thoroughly cleaned and then some of the cervical secretion should be removed and examined. In some cases where the canal of the cervix contains no mucus at the time, gentle suction by a modified breast-pump gives further information as to the contents of the cervical canal and yields very valuable information (Figs. 12, 13). When the amount of the secretion in the cervix is great, the cervical canal is usually dilated and enlarged. In other cases the amount of the secretion is not profuse, and it is of the greatest importance, in these as well as in all cases, to make use of the Schultze tampon, in order to determine the amount of discharge and to distinguish between the amount of secretion coming from the vagina and that which comes from the cervix and the uterus.

Examination of the Secretion.—A square cotton tampon is placed carefully and thoroughly around the cervix and left in place for twenty-four hours. This tampon is then removed with the aid of a bivalve speculum and whatever secretion is found in the center of its upper surface has come from the cervix and the uterus. If the pathologic secretion comes only from the cervix, it will be entirely mucoid in nature and will be colored. If, however, the secretion comes from the cervix and uterus, there will be, in addition to the mucoid secretion, a non-mucoid secretion from the uterus; the two, however, not being mixed. If the secretion comes from the uterus alone, we have a non-mucoid discharge on the tampon. The mucous secretion on the tampon or the secretion from the cervix drawn from it by suction is spread upon a glass and stained. We find, then, mucus, various forms of bacteria and bacilli, pus cells, high cylindric cells from the cervix, low cylindric cells from the uterus, very often squamous epithelial cells due to metaplasia of the ciliated cylindric epithelium of the cervix or uterus, and in some cases gonococci. Examination of the mucoid secretion is not satisfactory, for the reason that most of the cells,

epithelial, squamous, or pus cells, are enveloped by the mucus and their shape and form are frequently disturbed. Gonococci, bacteria, or bacilli are almost never found in the mucus itself. If after careful cleansing of the outer covering of the cervix, squamous cells are found in the secretion obtained from the cervix or by suction, that fact is corroborative of the existence of an inflammation, generally gonorrheal, for a chronic gonorrhea often produces a change to squamous epithelium in the lining of the cervix, frequently in the uterus. In old cases of gonorrhea or in cases subacute from the beginning, and especially in cases which are not treated by intracervical or intrauterine manipulation, it is extremely difficult to find gonococci, even when the examination is carried on shortly before or shortly after menstruation. In spite of the fact that in chronic gonorrhea at times a clear mucus may be passed, an inflammatory cervical catarrh can be generally diagnosed definitely by anomalies in the secretion.

As to glandular changes, we may have hyperplasia, yet the change is slighter than in the uterine mucosa. The round-celled infiltration of the mucosa of the cervix is generally superficial, but as the infecting bacteria enter the glands they produce infiltrations about the glands. The interstitial changes, however, are enough to obstruct the outflow from the glands and to cause cysts.

The cervix reacts to inflammatory irritation by the production of mucus. Hence, there are frequent cystic dilatations of the cervical glands, and we get cysts, follicles, and the *ovula of Naboth*. Through such dilatations and through their rising above the surface, we may get follicular polyps.

Ovula of Naboth.—(1) Where erosions are present on the vaginal portion, the ciliated epithelium which is present sinks deeper into the outer wall of the portio, its glands become obstructed at the outlet, and accumulations of mucus form little projections above the surface. These may eventually be covered by squamous epithelium. When the cervix has for a long time been the seat of catarrh, it may happen that the outlets of the glands which line it become obstructed. The cervical glands of themselves are enlarged and elongated, and sink deeper into the wall of the cervix. Such obstructed glands may still further burrow their way through the cervical wall until their base extends out, close under the squamous covering of the vaginal portion.

When erosions are present, this condition can be readily diagnosed, for we have a red granular surface present which renders the diagnosis of the etiology easy. In that form, however, which is due to the growth of the glands within the cervix the portio has no red irritated appearance, but under the squamous epithelium can be seen these single or multiple cysts projecting above the surface. When these projections are incised, a little glairy mucus is extruded. Their significance then is that they call attention either to changes in the intracervical glands or to change produced on the portio by extension thereon of ciliated cylindric epithelium.

Hypertrophy of the Cervix.—There are cases in nulliparæ in whom the existence of a chronic inflammation within the cervical canal produces structural changes in the wall of the cervix. The cervix becomes hard or rigid. These changes in nulliparæ, however, are not marked, for that would imply a deep extension of the inflammatory condition. Most of the involvement in such inflammations within the cervix is limited to the surface. The increased mucus discharge usually limits the infection to the surface or to the glands and prevents an extension into the muscular wall. However, by continued hypertrophy of the mucous lining, or by the continued extension of the inflammatory process beyond the area of the mucous membrane, inflammatory and fibrotic changes are produced which render the cervix hard, much thicker, and much larger in circumference. This more extensive form of hypertrophy of the cervix is observed in women who have borne one or more children. In them the cervix may be hypertrophied out of all proportion to the hypertrophy which has taken place in the remainder of the uterine wall. In a goodly number of cases the uterus, while more or less enlarged, is little changed in proportion to the tremendous high hypertrophy which involves the cervix. These changes in the cervix are found in women who have gone through frequent labors, and represent long-continued mild inflammatory involvement plus the hypertrophy of subinvolution so frequently resulting from numerous labors. That this condition, however, is generally dependent on an inflammatory process is shown by the frequency with which this hypertrophy is complicated by a chronic involvement of the posterior parametrium.

In women who have borne children a hypertrophy of the cervix

is often associated with a hypertrophy of the uterus also. The uterus is long and rigid. The everted cervical mucosa is pink or red, generally smooth, but often contains many white or yellow granular projections, like those observed in the throat and on the tonsils. Not infrequently pedicled or broad-based cervical polyps are present. A clear glairy mucus is noted. The canal is dilated. The change in the cervix is due to subinvolution and fibrosis of the cervix and uterus. There are no evidences of inflammation about the uterus. There is no posterior parametritis. The mucus shows no pathologic change. It is possible that streptococci, staphylococci, or bacterium coli of saprophytic type may be introduced into the cervix, and may alter the character of the cervical mucus, but, as a rule, this cervical secretion represents hypersecretion.

We must distinguish therefore hypertrophy and posterior parametritis due to cervical catarrh from hypersecretion present in a hypertrophied cervix due to subinvolution. If the cervix is enlarged and the uterus is normal, it speaks for the former. If both cervix and uterus are enlarged, it speaks either for subinvolution fibrosis or for inflammatory metritis.

When erosions, red external os, white or yellow mucoid discharge, and parametritis occur in a nulliparous woman, especially in one who has never been curetted, they are almost certainly due to a mild unrecognized gonorrheal catarrh. When erosions, red external os, white or yellow mucoid discharge and posterior parametritis occur in a woman who has aborted or has borne a child or children, especially if these conditions are resistant to treatment, they too are often the result of gonorrheal infection. Every cervical catarrh in nulliparæ or in younger multiparæ should be considered gonorrheal unless most exhaustive examination discloses another possible etiology.

If a woman has aborted or borne children or has been curetted, etc., we must, of course, take into consideration: (1) the possible introduction of other bacteria and (2) the retention within the uterus of macroscopic or microscopic fetal or decidual cells which cause a saprophytic fluor which discolors the cervical mucus. The other lesions noted in cervical catarrh, aside from erosions, red external os, white or yellow mucoid discharge, and posterior parametritis, are not so significant of gonorrhea. A distinction

must be based on the presence of other lesions, the time at which they were acquired, and the age of the patients. A distinction must be made between nulliparæ and multiparæ.

The additional lesions produced by chronic cervical catarrh, such as ovula of Naboth, metritis colli, and cervical polyps, are produced by the action of various bacteria or cocci of a saprophytic type or by saprophytes which grow on the non-resistant tissues of subinvoluted uteri in older women or in the subinvoluted fibrotic uteri of women at or near the climacterium.

In catarrh involving the outer surface of the cervix, the vaginal portion or portio, we observe the same changes as in colpitis. There are no folds, as in the vagina, and changes in the papillary bodies do not occur so markedly, for the papillary bodies in the mucous covering of the cervix are not well developed. We may have either a diffuse intense redness or red spotted alterations, looking like an eruption. There may be observed small excrescences resembling pointed condylomata.

SYMPTOMS

The two symptoms of endocervicitis are cervical mucoid discharge and the pain due to involvement of the cellular connective tissue. This involvement of the cellular connective tissue is called parametritis.

Parametritis.—The cervical portion of the uterus, in particular, is embedded in and surrounded by large amounts of connective tissue. The cervix enters into the upper end of the vagina at an angle with the latter. The position of the vagina, its relation to the levator ani, and its close union with the surrounding connective tissue, with the support furnished by the peritoneum, and by the surrounding ligaments, make the situation of the cervix a relatively fixed point. So long as the cervix is retained in this position and at this level, and so long as the uterus, its ligaments, and the parametrium preserve their natural elasticity, so long will the forces of pressure and tension within the abdominal cavity preserve the uterus in its normal anteflexed situation. The connective tissue about the cervix spreads out in the form of a six-pointed star. Each arm is covered by peritoneum, contains blood-vessels, muscle fibers,

and lymphatics. Thus are formed the six ligaments which find their attachment to the uterus entirely or in part along the cervix or at the level of the internal os, the broad ligaments, of course, extending up the fundus. The base of the broad ligaments, which is particularly rich in muscle fibers and lymphatics, is called the ligamentum cardinale.

An important function of the connective tissue, with its numerous muscle and elastic fibers, is to keep the cervix in an elevated position, and the elasticity of the ligaments is intended to give the uterus free play. As Winter says, the uterus may be pulled up to the symphysis, pushed toward the sacrum or up to the lateral pelvic wall or half-way up to the umbilicus, or the portio may be pulled down to the vulva, and all this without pain. When the uterus is pushed up or pulled down, it returns to its normal place because of the elasticity of its surroundings. It belongs, therefore, to the most movable parts of the body.

A chronic catarrh of the cervix may mean continued lymphatic infection. The uterosacral ligaments and the posterior parametrium are most frequently involved by the chronic catarrh. It is especially the uterosacral ligaments which are constantly becoming more inflamed through involvement of their lymphatic elements. After months or years they become sclerosed and shortened, causing backache and producing infiltration about the rectum and the sigmoid. In addition, there may be an invasion of the broad ligaments, though this invasion is generally marked in chronic cases, only when associated with lateral tears. This posterior parametritis produces a retrodisplacement of the uterus. (See Fig. 91.)

Such cases of catarrh may remain always located in the cervix and the surrounding connective-tissue areas, never passing, so far as evidences go, above the internal os. Such patients may have children and may never suffer from uterine, tubal, or peritoneal annoyances. A cervical gonorrheal catarrh also which does not extend upward after an abortion or a pregnancy, and thus permits of a second pregnancy, probably always remains in the cervix alone. Such patients finally come with a large cervix, a normal or large uterus, a parametritis posterior, or a retrodisplacement due to shortening of the uterosacral ligaments, or with

combinations of those conditions. Their main complaint is backache. Treatment often brings about a cure. Ofttimes the pain persists. They are then somewhat benefited by amputation of the cervix and by the performance of an Alexander-Adams operation. They are not infrequently best relieved by a hysterectomy. We must distinguish hypertrophy of the cervix plus parametritis which are due to cervical catarrh from hypersecretion present in a cervix and uterus hypertrophied as a result of subinvolution. If the cervix alone is enlarged while the uterus is of normal size, this condition speaks for the former. If the cervix and uterus are both enlarged, we are dealing either with subinvolution fibrosis or with inflammatory metritis.

DIAGNOSIS OF EROSIONS OF THE CERVIX

Catarrh of the cervix, or endometritis cervicis, is an inflammation of the cervical mucosa, extending from the external to the internal os, in the course of which inflammatory evidences may appear on the outer surface of the portio. It is easier to diagnose than endometritis, because part of the mucosa can be seen and because there are certain changes which occur on the portio with cervical catarrh only. If the lips of the cervix are everted by the use of volsella, the cervix mucosa is seen to be red, velvety, and shiny. Erosions, ectropion, follicles of Naboth, metritis colli, polyps, are sure signs of existing or previously existing cervical catarrh. Erosions are due to maceration and desquamation of the squamous epithelium and the covering of the denuded areas by cylindric ciliated epithelium which grows out from the cervival canal. Erosions may have a rough or furrowed surface and an irregular periphery. The color is a light red to a scarlet, sometimes bluish-red in pregnancy. Simple erosions have a smooth even surface. A few follicles may be present in the circumference. Follicular erosions evidence many tiny follicles in the erosion or in areas covered by squamous epithelium or in areas of a red character. Papillary erosions have a surface which feels smooth, but is of a finely granular character due to microscopic projections. They bleed easily when the mucus is removed; they are sharply outlined and contain no follicles. Erosions are to be distinguished:

(1) from circumscribed reddening of the portio in colpitis, which latter is not concentric about the os, is not velvety, and bleeds very easily; (2) from a red congested cervix due to irritations produced, for instance, by a pessary; (3) from ulcerations of the cervix due to irritation and injury, as in cases of prolapse of the uterus; (4) from true ulcers of the cervix, which are usually syphilitic or tuberculous; (5) from ectropion, which means irritation and inflammation of the everted lacerated cervical mucous membrane. Only the papillary, and rarely the follicular forms, resemble malignancy. When the cervix is torn in labor and the lips gape, the cervical lining is often everted. If no inflammation is present in the vagina or in the cervical canal, the everted mucous membrane has sometimes a red appearance, but usually the epithelium undergoes epidermal changes and no redness is present. With inflammation the everted mucous membrane is markedly red, is elevated, and takes on the appearance of an ulcer or fungus. There is hyperplasia of the glandular epithelium and often hypertrophy of the glands. In other words, we observe on the everted cervical lips those changes which take place within the cervical canal in cases of catarrhal infection. This condition is known as inflammatory ectropion. The everted mucosa is red and we see folds representing the arbor vitæ of the cervix and also newly formed furrows. It looks like fresh red granulation tissue, and if it bleeds easily, it may suggest carcinoma.

DIAGNOSIS OF ENDOCERVICITIS

One of the surest evidences of the existence of infection of the cervix is a slight zone of inflammation about the external os. This zone is of a bright and sometimes a dark red color and has a shiny appearance. Further proof is furnished by a slight extrusion of the red cervical mucosa of the anterior and posterior cervical lips. These two changes may be present with or soon after an acute invasion also. In the early stages of an infection erosions are rarely formed. It is with the chronic catarrhal infection of the cervix that erosions take place. In the cervical catarrh of nulliparæ with narrow external os the mucus is retained and the canal is dilated. In all cases of cervical catarrh, and especially if the

above evidences are absent, the secretion should be examined. The secretion may be clear or it may be grayish or yellow. It contains epithelium, leukocytes, or in more infectious stages it may be mixed with pus and be very yellow or green. The diagnosis between hypersecretion and inflammation is important. In the latter we find inflammatory changes in the mucosa, erosions, the admixture of pus, and often vaginitis. Cervical catarrh in the absence of these symptoms should not be diagnosed without anomalies in the secretion.

Follicles of Naboth are retention cysts which occur in the fundus of the glands of the cervix, or in the glands of erosions. They are small circumscribed projections containing translucent light or yellow mucous. If situated deeply, they may cause thickening of the portio. If this thickening is associated with interglandular hypertrophy, it is known as follicular hypertrophy.

Chronic induration or metritis coli, when not due to subinvolution and not part of a general uterine hypertrophy, is a sequela of catarrh. The cervix becomes thick and hard and fibrous. The cervix may be enlarged through concealed ovula of Naboth or through the extension of the chronic inflammation into the connective tissue and muscle fibers of the cervix and into the connective tissue immediately about the cervix.

Extension of the inflammation into the connective tissue about the cervix, or into the connective tissue of the six ligaments connected with the cervix, produces parametritis. By far the most frequent form is the so-called parametritis posterior chronica which involves the uterosacral ligaments and the posterior parametrium.

Pain in the back and limitation of mobility of the cervix are noted in chronic cases (Fig. 91). In newer cases the uterosacral ligaments feel swollen and tender on examination. Mucous polyps may be found in connection with chronic cervical catarrh. They consist of circumscribed hyperplasia of the cervical mucous membrane. They vary in size from a pea to an egg and, as a rule, have a long pedicle. They are soft and shiny, red and covered with mucus, and bleed very easily. The surface is generally lobulated and they often contain small retention cysts. They are generally found in multiparæ after the existence of an extremely mild, long-continued intracervical irritation. In women near the

climacterium they speak rather for a saprophytic involvement of cervical tissue non-resistant in character.

TREATMENT

Treatment of cervical catarrh should be conservative and carried out entirely in the vagina and not within the cervix. Our whole purpose is to remove from the cervical canal the causes and the products of the inflammation. The cervical lining is not smooth, but is composed of deep depressions forming an irregular surface. This canal is lined with high cylindric epithelium. The bacteria, bacilli, or cocci which are producers of the inflammation may be located deep down in these recesses, even if not diffusely so, or between the epithelial cells or underneath the epithelial cells.

Local applications cannot destroy the bacteria in the depths unless we at the same time destroy the entire cervical lining. In my experience, local applications keep up the irritation, and if of a strong nature they produce hard, sclerotic changes, and the tendency is to send the inflammation further into the cervical structure and out into the surrounding connective tissue. Our whole purpose, then, should be devoted to gently cleaning the cervical canal and draining out all the products of inflammation in the deepest recesses, and in this way aiding nature in throwing off the remaining infecting bacteria. If the cervical secretion is extremely tenacious, only as much as can be done without injury should be removed by gentle sponging and cotton applicators. By the use of a suction bulb, as much more as possible should be drawn out (Figs. 12, 13). Then boroglycerin to the amount of 1 ounce is poured into the vagina through the bivalve speculum. The fornices are then gently but firmly packed with one long strip of 6-inch wide soft gauze. This brings the glycerin into intimate contact with the intracervical mucosa. The long strip of gauze is then gently packed into the vagina and the whole is allowed to remain in place for twenty-four hours (Figs. 47, 49, 90). As a result, a large amount of serous exudation takes place, the glycerin drawing out the cervical contents and acting on the deeper recesses as well. At the end of twenty-four hours the gauze is taken out and a vaginal douche is given. This treatment by

glycerin is carried out two, or better three, times each week. Regular examination of the cervical secretion corroborates the improvement apparent to the eye, for the secretion becomes gradually paler in color until it finally becomes quite clear and microscopic examination shows almost no pus cells and only squamous cells. If this treatment is continued, the cervical secretion finally becomes clear and our purpose is accomplished without irritation of any form. I rarely use intracervical applications of any form, except perhaps once to produce an increased discharge as an aid in the final microscopic diagnosis.

The *erosions* are treated by local applications of carbolic acid, followed immediately by a thorough painting of the whole cervix and fornix with plain tincture of iodin. Glycerin, which is used for its influence on the cervical lining, is of undoubted value in the cure of erosions, for it dehydrates and draws out from the depressions in the erosions the inflammatory products and the producers of inflammation. The choice of medicated douches which are used in conjunction with this treatment depends on the stage of the condition and on the associated bacteria found by examining the vaginal secretion. The three best drugs are, first, acetate of aluminum, 1 dram to the quart, because of its healing effect; bichlorid of mercury, 1 : 1000, because of its destructive action on associated bacteria and because of its great value in those cases where gonococci are found; and an astringent powder in the form of sulphate of zinc plus tannic acid 2 drams to the quart, which are of use in the later stages where hypersecretion still persists.

Patience is needed in the treatment of cervical erosions, as their cure not infrequently takes several weeks. It is not sufficient to make local application to the external surface of the cervix. The associated cervical catarrh must be treated and cured. The best form of treatment is the application of pure carbolic acid by cotton applicator to the entire erosion area. The application is allowed to remain for only a few seconds if the erosions are superficial; but if the erosion is papillary or glandular, the carbolic acid must be allowed to act longer, the idea being to destroy the ciliated epithelium which is growing in the area normally covered by squamous epithelium. The application of carbolic acid is then immediately followed by several applications of pure tincture of

iodin, which is applied also to the entire cervix covering and to the vault of the vagina. The alcohol in the iodin tincture neutralizes the further action of the carbolic acid and the iodin is applied for its alterative and antiseptic properties. An ounce or more of boroglycerin is then poured into the vagina and the vagina is packed with gauze, which is thoroughly packed into the fornices. The gauze is removed at the end of twenty-four hours and vaginal douches are given twice daily consisting of the above-mentioned three drugs or of three to four tablespoons of pyroligneous acid in 2 quarts of water. The applications to the cervix of iodin are made three times a week, the carbolic acid being applied once or twice a week, according to the degree to which the ciliated epithelium has been destroyed. Unless the ciliated epithelium is entirely destroyed (and not too deeply at any one time, in order to avoid bleeding or oozing) the erosion will not heal. When healing takes place, the squamous epithelium is seen to gradually grow in from the edges. In the later stages its growth may be stimulated by the local application of nitrate of silver from 1 per cent. up to 5 per cent. It may be done once or twice a week. The purpose of the boroglycerin treatment is to draw out the cervical mucus and to draw out the cervical inflammation from the very depths of the glandular recesses. When the canal becomes clearer and the mucus becomes colorless, the lining of the cervix may be gently painted with tincture of iodin or with 1 per cent. nitrate of silver.

In the treatment of erosions stubborn cases must be painted with 50 per cent. solution of chlorid of zinc. In other cases the erosion must be painted with pure pyroligneous acid or with pure formalin followed by the boroglycerin treatment. The cervical canal in certain stubborn cases is gently cleared of its mucus and is painted with 2 to 5 per cent. silver or with 10 per cent. solution of chlorid of zinc. In my experience the avoiding of intracervical treatment is in most cases followed by good healing results and no induration, inflammation, or stricture of the canal takes place.

If follicles are present, they should be opened, the mucus squeezed out, and the little recess should then be touched with carbolic acid, followed by iodin.

A distinction must be always made between erosions and ectropion.

Ectropion simply represents the everted mucous membrane of the cervix, when deep lateral tears are present. Hence ectropion is found only in women who have borne children, while erosions are present in nulliparæ or multiparæ, most frequently in the former. In cases with marked ectropion or in erosions of the cervix associated with diffuse hypertrophy, especially where the cervix is filled with dilated follicles, high amputation of the cervix gives an immediate and satisfactory result.

Local applications to the lining of the cervix which exert a superficial action are of no utility for destroying the causes, and certainly of no value from a healing standpoint, *so long as a mucus plug obstructs the cervix and bacteria are still present in the glandular recesses.* If for no other reason, routine intracervical treatment is contraindicated in such conditions. Local applications to the cervical lining which have a deep cauterizing action often only serve to keep up the inflammation, to send it out into the cervical wall or into the surrounding connective tissue or further up into the uterus and often higher still. The element which frequently sends the cervical infection (if gonorrheal) further up is parturition, in which case we have, as a rule, a late infection. Abortion is a frequent factor in sending an infection further up. A curetting is of still greater danger in causing an ascending extension of the original cervical condition. Ectopic gestation occurs more frequently in women who have borne children than in women pregnant for the first time. This is due to the fact that parturition often results in an ascending infection which mildly involves the tube. If the involvement of the tube is sufficiently marked to cause closure of the external ostia, these patients are permanently sterile. If, however, the cocci are less virulent the tubal ostia are not closed, the infection in the tubes is not so extensive as to prevent regeneration of active ciliated epithelium, and the sterility is only temporary, though it may last for years. Women are rarely treated for secondary sterility, and in such cases no additional harm is done by intracervical or intrauterine applications. In other words, no increase of the tubal affection is produced. Therefore the tubal affection in such uniparous women is often relatively slight, and in them or even in severer cases goes on to healing or else is almost healed at the time when the ectopic gestation occurs. Nulliparæ,

on the other hand, are frequently treated for sterility. The cervix is dilated, the sound is used, curetting is done, intrauterine applications are made, the mucosa is constantly irritated, inflammatory extension upward is constantly stimulated, and as a result the tubes grow progressively worse and have no chance to heal even partly. Therefore either the tube-ends become closed or the ciliated epithelium in the tubes is in such a state that no ovum is drawn into the lumen and therefore ectopic gestation in them is much less frequent. Many nulliparæ have a specific (gonorrheal) cervical catarrh without any knowledge on their part, but become pregnant before sufficient harm is done to both tubes to prevent the ovum from entering the uterus.

ENDOMETRITIS

A healthy endometrium is essential to the functions of normal menstruation and of pregnancy. The endometrium in its structure is very much like lymphatic tissue. It is lined on its inner surface by a single row of epithelial cells and contains in its lymphatic stroma glands whose epithelial lining is in direct continuity with the single layer of epithelium which lines the endometrium. This endometrium undergoes, from the age of thirteen on, a periodic monthly stimulation by the ovarian secretion which results in a periodic hypertrophy of all the constituent elements and in congestion of the blood-vessels and capillaries. The purpose of this periodic stimulation is to furnish a proper basis in which an ovum, if fecundated, may grow. The endometrium naturally undergoes alteration in connection with, and in consequence of, its intimate relation to the local processes involved in menstruation and in pregnancy. At a later period, at the climacteric age, the endometrium, through atrophy of the ovaries, undergoes regressive steps, the course of which may be changed by the injuries which it has sustained during the various periods of life.

The uterus with its lining is at all times under the direct trophic control of the ovaries and their secretion. Normal ovaries are necessary to the production of a uterus and endometrium capable of performing the regular function of menstruation and of furnishing a nest for the development of a fecundated ovum. The endometrium through direct involvement of its own elements, through interference with its blood-supply, through involvement of its trophic centers, the ovaries, may at various periods of the feminine life undergo alteration in its character and structure. The endometrium is liable to changes during childhood. It is subject to injuries as a result of local or constitutional infectious diseases at any period. It is subject to injuries in connection with pregnancy and undergoes alteration on the presence of new-growths.

Etiology.—In childhood we are concerned with an etiologic

factor included under the head of the infectious diseases of childhood, such as measles, scarlatina, mumps, typhoid and diphtheria, etc. The diseases not infrequently produce lesions of varying degrees in the ovaries themselves or in the lining of the uterus. These alterations may be temporary or permanent. If permanent, they begin to manifest symptoms when the ovaries and endometrium enter into the menstrual phase. We therefore may have early changes in the endometrium due to direct involvement of the uterine lining itself in the course of these infectious diseases of childhood, or else we may have secondary changes in the endometrium due to impairment of function in the ovaries themselves. These latter lesions are trophic in their nature.

In children we are further concerned with a bacterial infection of the genital tract by the gonococcus, which manifests itself, as a rule, in the form of an acute vulvovaginitis. This disease is very difficult to cure, because the gonococci thrive exceedingly well on the genital epithelium of the child. It is, however, not generally recognized that in many cases the gonococci produce an infection of the cervix, and that factor plays an important part in keeping up the inflammation in the vagina and vulva. In addition, in not a few instances, even when no symptoms are present, the uterine lining itself is involved. In cases in which the inflammation is present in the endometrium it may extend up into the tubes and out into the peritoneum. While not recognized at the present time, a gonorrheal peritonitis in children is by no means infrequent, and the probability is that the majority of these cases are diagnosed as appendicitis. It is certain that this etiology bears an important relation in such cases to the subsequent condition of the endometrium, either primarily, through the direct involvement of the uterine lining, or else through some involvement of its trophic centers, the ovaries.

When the menstrual function begins, existing alterations in the structure of the endometrium considerably influence the course of menstruation. Other infectious diseases, such as typhoid fever, may later come into play. Such an etiology may affect the endometrium primarily and directly, or secondarily through the involvement of the ovaries. At this period, and at any other subsequent stage, congestions in the genital tract certainly have an

important bearing on the character and growth of the endometrium. Among the causes of pelvic congestion a place of importance must be given to onanie or masturbation.

A further important etiologic factor in adult life, and one which is inflammatory in its character, is infection by the gonococcus, which infection may be acute or subacute in its nature. In fact, a very large proportion of gonorrheal infections of the endometrium are of so mild a character as to be scarcely recognized until associated lesions call attention to their existence. Here, too, involvement is primary and direct, but may be complicated by involvement of the trophic function of the ovaries.

An element of importance with regard to the endometrium is concerned with the period of the female life in which pregnancy may occur, and here we must consider interruptions of pregnancy in the form of abortion, ectopic gestation, labor at full term, etc. The changes to which the endometrium is then liable are due to the relation which the endometrium bears to the growing ovum. Alterations in the character of the endometrium may be due to the fact that cells of the trophoblast or chorionic cells or placental structures remain and prevent a return to the normal on the part of the endometrium. Even if no cells of the ovum be left behind, a complete restoration to the normal implies a disappearance of the decidua and a substitution by normal endometrium. However, decidual cells or the entire decidual membrane may remain or the mucosa may return only partially to the normal. Another factor of importance in connection with pregnancy is the failure on the part of the uterus to return to its normal state. We refer here to the condition known as subinvolution, wherein congestion and hyperemia play an important part in altering the form and structure of the uterine lining.

Various infections may occur in connection with pregnancy, which infections are generally classed under the title of puerperal infection. This is of two forms: (1) Puerperal infection may be due to bacteria and bacilli introduced from without by examination or intrauterine manipulation, or (2) it may be due to bacteria present before pregnancy, which bacteria are then frequently the gonococci. We are concerned in these infections mainly with streptococci, staphylococci, the bacterium coli, the gonococcus, and saprophytic bacteria and cocci.

Diseases about the uterus have a bearing in altering the appearance or function of the endometrium, either through the pressure which they exert on the vessels running into the uterus or because these diseases are inflammatory in their nature. Since most of the inflammatory conditions about the uterus are the result of infection extending through the uterus, we are really concerned with alterations in the endometrium due to the same causes as produce the periuterine inflammation, or else we are concerned with alterations in the endometrium resulting from inflammatory involvement of the periuterine vessels and of the ovaries. Among the bacterial infections to which the uterus is liable must be mentioned that by the tubercle bacillus, which, while rare, does occur in the form of an ascending infection from the cervix, or in most instances in the form of a descending infection, subsequent to involvement of the peritoneum.

Aside from these changes in the endometrium new-growths have an important relation to the lining of the uterus. It is natural to expect a deviation from the normal with sarcoma or carcinoma, but as these two conditions have symptoms of their own, the alteration in the character of the endometrium is of secondary importance. With myomata, however, the question is different, for we are concerned here either with small unrecognized tumors or with larger recognized tumors. When myomata are situated in the uterine wall, or particularly when they are situated under the mucous membrane, it is only natural that their presence and the pressure which they exert and the congestion which they produce, together with the zone of hyperemia about their periphery, should produce alterations in the character and structure of the uterine lining.

At a still later period, at the time of the climacterium, the uterine lining is supposed to undergo regressive changes. Here too variations in this process may take place, sometimes depending on the alteration produced in earlier years, at other times depending on the changes which are going on in the ovary. Many local changes, therefore, are dependent on the trophic action of the ovaries; hence the various deviations from the normal which are so frequently found at the climacteric period.

Non-inflammatory Alterations of the Endometrium.—The

uterine lining may undergo modifications by any new-growth involving the uterine structure, such as carcinoma, sarcoma, and fibroma. With carcinoma and sarcoma we are concerned with affections which have a specific appearance and symptoms of their own. Fibroids, whether single or multiple, whether large or small, especially if situated in the uterine wall and near the mucous membrane, produce changes especially in the glands of the endometrium. Though this condition with large tumors is of secondary importance, yet the associated hyperplastic changes due to the presence of fibroids are called endometritis, but it can readily be seen that inflammation plays no part in causing this change. When a pregnancy has existed in a tube, the uterine lining undergoes change to decidual tissue. During the various stages of ectopic gestation this decidual lining may be thrown off, may retrograde and return to the normal state, or it may remain more or less subinvoluted. This may leave a hypertrophic uterine lining which involves the glands also, and which is called endometritis, but, again, is not inflammatory in etiology. With a pregnancy interrupted at any stage, that is, with abortion, we may have a failure on the part of the endometrium or decidua to return to the normal. Either the decidua is retained in whole or in part, or else it does not return entirely to the normal or else microscopic or macroscopic remains of chorionic villi are retained. This may produce a form of so-called hypertrophic endometritis involving the glands and interstitial cells too, but is likewise non-inflammatory in its causation.

In labor occurring at full term the uterine lining is thrown off, leaving only the deeper glandular areas in place for the purpose of restoring a normal endometrium. Here, again, the decidua may not be cast off as it should be. There may be a retention of macroscopic or microscopic chorionic cells or placental structures, and a condition also called endometritis results, which is not inflammatory in its nature. Even if in all of these pregnant states the decidua is cast off entirely, and even if chorionic or placental cells do not remain, a failure of involution on the part of the uterus may keep up a persistent state of hyperemia which prevents the growth of a normal endometrium and frequently produces a hypertrophy or overgrowth, or also a hyperplasia involving especially the glands.

This, again, is a non-inflammatory "endometritis." Retroflexions of the uterus, especially post-partum displacements of the uterus associated with descent, and often normally situated uteri, especially after labor or abortion, are often accompanied by congestions which prevent the endometrium from remaining in a perfectly normal form. Here, again, we are concerned with a non-inflammatory "endometritis," hypertrophic and hyperplastic in character. The same disturbances may be evidenced in pathologic cardiac and constitutional affections, with which congestions and abnormal blood-supply in the pelvis and uterus are supposedly associated. General subinvolution after labor implies a state of systemic inelasticity and unevenly distributed blood-supply. Here all the abdominal and pelvic structures are affected by venous congestion and stasis. The ovaries, perhaps, in some cases exert an undue and abnormal stimulation upon the endometrium, produce excessive hyperemia and congestion, and eventually aid in the formation of an overgrowth of the endometrium. Ovaries involved by inflammatory or degenerative processes, as a rule, under-stimulate the endometrium, but at the same time fail to exert a normal trophic action on the uterine muscle. As a result fibrotic and sclerotic changes occur in the muscle and elastic fibers of the uterine wall, and arteriosclerotic involvement of the blood-vessels and capillaries takes place. Such alterations, if associated with circulatory disturbances in the uterus and endometrium, may lead to hypertrophy rather than atrophy.

Inflammatory Endometritis.—Now as regards the inflammatory form which really justifies the name of endometritis, and which is, almost in all instances, at least interstitial in its microscopic characteristics, we are concerned with the action of bacteria. The evidences are those present with inflammation in any mucous membrane. Often enough the process is mild or subacute or chronic, and for that reason simply "catarrhal" in its manifestation.

As mentioned above, changes in the endometrium may often be referred back to the inflammatory or necrotic alterations in the uterus complicating the infectious diseases of childhood or to infection by the gonococcus at the childhood stage.

Bacteria, bacilli, or cocci and their irritations may be present

in a nulliparous uterus or in a uterus in which at one or more times a pregnancy took place. In the cases of pregnancy, whether it end in abortion or at full term, we are concerned with the so-called septic or puerperal infections. Here we are dealing with streptococci, staphylococci, in some instances with bacterium coli, and in many cases with gonococci, or else we are dealing with saprophytic bacteria which grow on dead tissue only and which cannot survive in the living endometrium itself. These saprophytic bacteria may produce changes in the uterine cavity if placenta or membrane or other products of conception are present, but once these are removed the saprophytic bacteria disappear. On the other hand, the streptococci, staphylococci, and bacterium coli grow on the actual structures of the uterus and produce an endometritis or a metritis, or any or all of the various inflammations usually associated under the heading of post-partum infection. In addition to these, we are concerned in a very large number of cases with the gonococcus. The gonococcus, when present before a pregnancy, or when introduced after conception has taken place, concerns itself primarily with the uterine lining and the uterine wall, and often enough with all the other periuterine structures, and plays a very important part in the production of endometritis. If, however, we consider cases in which pregnancy has never occurred, the streptococcus, the staphylococcus, or the bacterium coli find their way into the uterus only by infection during operation or intrauterine manipulation. Therefore an inflammatory endometritis produced by these invaders presupposes some intrauterine manipulation. While this may occur, the vast majority of cases of inflammatory endometritis in nulliparæ are due to gonococci. The gonococcus may produce an inflammation in the uterine lining which is acute or subacute. The gonococcus has the characteristic in most cases of being superficial in its growth and exercising its energies mainly on the mucous membrane, but in a goodly proportion of cases its action is not alone superficial, but deep, involving the uterine wall to varying degrees and extending out into the lymphatic connective tissue. Hence, the great variations in the course of gonorrheal infections are due to the fact that the infection is either acute or subacute, superficial or deep. Many of the symptoms generally associated with an endometritis gonorrheal

in its nature are not so much due to the endometritis as to the associated metritis.

Associated Changes in the Uterine Wall.—A point of importance is the necessity of considering the affections of the endometrium in conjunction with changes in the structure of the uterine wall. If we are dealing with an endometritis inflammatory in its character, we must consider that the same bacteria or cocci may, and probably do, involve the uterine wall, producing changes there in the character, amount, and structure of the component elements, and that this alteration in the function of the uterine wall has a bearing on the symptoms supposedly or actually associated with the involvement of the endometrium alone. On the other hand, changes in the ovarian trophic center, or such changes as are associated with pregnancy in the tube or uterus, may likewise produce alterations in the uterine wall. The important changes in the uterine wall with a non-inflammatory cause are those changes known as subinvolution, which means hypertrophic and fibrotic alteration in the uterine wall with consequent modifications of the symptoms supposedly or actually associated with the alteration of the uterine lining.

With any of the non-inflammatory causes mentioned above there may be combined an inflammatory etiology. An inflammation may be present before or may be acquired during or after the pregnant state. This causes a mixed condition, that is, a combination of the inflammatory form of endometritis and the non-inflammatory forms mentioned above. Therefore, to repeat again, endometritis may be inflammatory, non-inflammatory, or a combination of the two.

Interstitial and Glandular Changes.—The term endometritis is generally used to include all these alterations of the endometrium which are not malignant or which do not practically or really form a new-growth. Under the heading endometritis are usually grouped those affections of the mucous membrane of the uterus in which the microscope shows changes in the structure of the essential component elements. The changes represent differences either in the character or in the amount of the elements composing the endometrium. Reference is usually made (1) to alterations in the stroma or interstitial round-celled connective-tissue

basis of the endometrium, or (2) to changes in the glands situated in the stroma, or (3) to a combination of the two. It is customary to speak (1) of interstitial endometritis which affects the connective-tissue stroma in character and amount, (2) of a glandular endometritis which affects the glands in size, character, and number, and (3) of a combination of the two. It was said that a certain proportion of the cases of endometritis are inflammatory in etiology. A large number, however, are not. An attempt has been made to consider the interstitial form as inflammatory and the glandular as non-inflammatory. Microscopic evidences in the hands of the many observers have shown glandular changes to be also present with inflammatory causes, so that an exact line of division does not exist.

Even though this be so, it is true that a very large number of cases of purely "glandular endometritis" are not to be referred to the irritative action of bacilli and bacteria, but are due to the non-inflammatory causes mentioned above. Inflammatory cases, however, always show interstitial endometritis. Interstitial endometritis is always inflammatory. If we concern ourselves, then, with those numerous cases in which both glandular and interstitial changes are present, we come to these facts. The lining of the uterus is at all times under the trophic control of the ovarian secretion. The endometrium undergoes special periodic stimulation at the menstrual period in the form of hypertrophy of all the elements. It undergoes still further changes during pregnancy, either uterine or tubal, in the form of decidual reaction. In the case of uterine gestation the endometrium is invaded by trophoblast cells of the ovum and by chorionic villi. Alteration of the ovarian secretion, whether subsequent to the presence of ectopic gestation or to the presence of an ovum in the uterus, often results in or is followed by permanent changes in the form and character of the uterine lining. These changes not being inflammatory, are not interstitial in their character, but glandular, hypertrophic, and hyperplastic. If, however, with any of these non-inflammatory causes an inflammatory etiology is also present, then we get, in addition to the glandular change, an interstitial alteration, and it is probably this fact which makes the combination of the two so frequent. In many of these cases we are dealing with an inflam-

matory and a non-inflammatory etiology, while in other cases it is probable that the inflammatory interstitial changes cause circulatory and irritative alterations which also involve the glands. In other words, we may have: (1) an inflammatory interstitial change superimposed upon an existing glandular non-inflammatory alteration; (2) we may have associated glandular changes resulting from the congestion and hyperemia consequent upon the presence of interstitial inflammation in or about the uterus. If any inflammation of the uterus involves the ovaries, a glandular trophic condition may be added to the local inflammatory. If the wall of the uterus is affected by inflammatory invasion, disturbances in the form of congestion take place, with resulting hypertrophic hyperplastic glandular growth, so that even though inflammation is responsible in many cases for glandular alterations in the endometrium, they are really secondary in their nature, and are due either to the trophic involvement of the ovaries, or to the changes consequent on congestion and hyperemia. In other words, they are, strictly speaking, not the immediate result of the inflammatory invasion itself.

Therefore, for all practical purposes it would be well to speak of the interstitial form as inflammatory, the entirely glandular form as due to non-inflammatory causes, and the combined glandular and interstitial form as due to both causes, with the inflammatory interstitial change as the important involvement.

In considering the various direct local disturbances which may take place in the endometrium we see that we are concerned (1) with causes inflammatory in their nature, (2) with causes which are not inflammatory.

Endometritis may therefore be considered under these two headings. Under the inflammatory forms we are concerned with acute infections of the endometrium which are due to puerperal infection and to the gonococcus. We are further concerned with the local changes occurring in connection with constitutional diseases, the infectious diseases of childhood, especially scarlatina. The subacute purely local inflammations of the endometrium are in almost all instances due to gonorrheal infection. Inflammatory involvement of the endometrium may be either superficial or deep; it may be diffuse or circumscribed. It may exist as a simple endo-

metritis without involvement of the uterine wall, or may exist in conjunction with an involvement of the uterine wall. An inflammatory involvement of the endometrium may exist without extension into the tubes, peritoneum, or periuterine structures, or it may exist in conjunction with these conditions. All these variations of superficial infection, deep infection, diffuse or circumscribed involvement, simple endometritis, or endometritis with involvement of the uterine wall may be present with either the acute or subacute forms.

"Endometritis" from the Standpoint of Microscopic Findings.—Endometritis should be considered next from the standpoint of microscopic findings. (*a*) ***An acute inflammation*** of the endometrium is interstitial in its character. In the chronic form and in acute recrudescences there are only circumscribed groups of round-celled infiltration. As a result of the increase of small round cells there is thickening of the entire mucous membrane, there is an increased blood-supply, and the endometrium looks red. There is a growth of the small round stroma cells. The round cells which constitute the stroma of the endometrium are increased in number. They consist of a round nucleus which fills out the entire cell so that almost no protoplasm is evident. The glands in the endometrium are separated and pushed apart by the increased interglandular tissue, and for that reason seem diminished in number. In addition, there is infiltration by round cells, such as is usually observed with any inflammation. In interstitial endometritis we have all the changes characteristic of inflammation. The interstitial tissue is infiltrated with small cells in proportion to the severity of the inflammation. The round cells completely replace the original cells of the interstitial tissue in certain areas, so that gland sections are absolutely surrounded by small-celled infiltrations. The epithelial cells of the glands proliferate in certain areas as a result of the increased blood-supply. The small round cells become larger and epithelioid in form through the increased nutrition due to the newly formed vessels present with inflammation.

There is another interstitial involvement of the endometrium, which, however, is *exudative* in form, and which clinically manifests its presence by the existence of a sensitive endometrium and

by the symptom of dysmenorrhea. There is a sero-albuminous exudate between the stroma cells which looks like a finely dotted mass which pushes the cells apart. There are also scattered areas of round-celled infiltration and the glands are compressed. The exudate is irregularly distributed and in some parts cells are close together and in other parts cells are pushed apart. Although not generally considered as inflammatory in etiology, some cases, if not all, are probably to be referred to this heading.

If there is no restoration to the normal after an acute interstitial inflammatory involvement of the endometrium, there results what is known as a chronic interstitial endometritis. The epithelial cells become fusiform and stellate and form fibers. Spindle cells are then present in place of the round original cells. The round cells are mixed in with the spindle cells and the uterine lining has a fibrous look. A further stage of this condition results in *atrophy or cirrhosis* of the endometrium. The endometrium becomes thin, its surface is irregular, there is an irregular line of demarcation from the muscularis, and the vessels are dilated and thickened. Inflammatory recrudescences are evidenced by the presence of new round-celled infiltration among the spindle cells. Such cases are helped but little by curetting, and by this operation very little membrane is obtained because of this atrophic change. The glands are compressed and atrophic. The resulting stage forms what is known as *atrophic endometritis*.

An interstitial endometritis often results in an irregular picture if the glands are compressed and if recurrent attacks produce sclerotic changes in the stroma. Just as in cirrhosis of the liver there is compression, so the interstitial tissue compresses the glands. They become dilated or cystic and contain cell detritus. These dilated glands, in turn, compress the stroma so that dilatation or ectasia of the glands results. The presence of cysts combined with the presence of spindle cells speaks for a chronic inflammatory process.

(*b*) In discussing *non-inflammatory involvement* of the endometrium we are concerned mainly with changes produced by abortion, by the retention of decidua, by subinvolution of the uterus, by displacements of the uterus, by the presence of myomata, or by trophic changes resulting from involvement of the ovaries. That

a special microscopic appearance should be observed in the non-inflammatory cases is to be expected.

An "endometritis" resulting from such an etiology is non-inflammatory, hypertrophic, hyperplastic, and glandular in its nature. There is an increased growth of the epithelial cells. There are papillary elevations of the surface epithelium and the surface of the uterine lining is wave-like. The mucosa becomes thicker. The glands are enlarged and dilated, and for that reason come closer together. When the glands are still further increased through epithelial growth, they become twisted and screw-like in shape. Through the tendency of the increased extent of epithelial surface to accommodate or place the increased epithelial elements there takes place a papillary appearance in the glands, which on section gives them a saw-like appearance. Glands become dilated by the increased secretion and may become cystic. The whole endometrium is thickened. Hyperplasia may also take place. New glands are formed from the surface epithelium and branches are given off from glands, either by eversion or by inversion.

Glands increase by a process going on in the gland lumina and called inversion, or by a process taking place outside of the glands and called eversion. Hypertrophy means an increase in the size of the glands. Hyperplasia means an increase in the number of glands produced by division or by glands given off from the main glands with an increased number of lumina. A still further change is the growth of the glands into the muscularis of the uterus. This latter condition readily recurs after curetting or treatment, and spontaneous cure at the menopause age seldom takes place (Winter).

(*c*) In a combination of the interstitial and glandular form we find the glands enlarged and papillary, but instead of being near together, they are pushed further apart by the increased interstitial tissue. Evidences of interstitial inflammation are present. If in connection with interstitial endometritis the glands become wider, and if papillary epithelial projections are present in the glands, we have an endometritis interstitialis and glandularis. If in glandular endometritis with enlarged glands and saw-like glands the glands are not close together and there is an interstitial change, we have endometritis glandularis and interstitialis. If it

is hard to decide whether there is more glandular or interstitial change, the term diffusa is used.

Endometritis fungosa defines a change in the endometrium in which the mucosa projects above the surface like a fungus. Sometimes there is more of the interstitial change, sometimes more of the glandular. At any rate it signifies a hyperplasia as the basic alteration, and refers particularly to the glands.

In some cases of myoma the surface layers show interstitial changes while the deeper layers show a glandular change.

In the hemorrhagic form of endometritis the microscope shows an endometrium which looks like menstrual membrane. In some cases the appearance is so characteristic as to be termed apoplexy. In the above various conditions involving changes in the endometrium the vessels may show no change; they may be dilated, there may be hemorrhage in the tissues, the walls of the capillaries may be thickened, the entire endometrium may look like the endometrium of menstruation, and, as said before, so much blood may be present in the tissue that it deserves the name of apoplexy.

Characteristic Differences under the Microscope.—In acute interstitial endometritis there is an increase of the small round cells. In the subacute or chronic form spindle-shaped cells predominate. In the dysmenorrheic form we find in the mucous membrane round. cells which possess a protoplasm and a small sharp nucleus, and the cells seem to lie free in the interstitial and exudative tissue. Spindle cells and larger cells with protoplasm are also present and the entire picture resembles that of decidua. In decidua, however, all the cells are changed. In the interstitial and in the exudative forms the change is not uniform. In addition the intercellular substance in decidua is homogeneous and but little fibered, whereas, in exudative endometritis it is finely dotted and fibered. Presence of ectatic glands, cysts, and bands of spindle cells speaks for chronic inflammation. In glandular endometritis with myoma the stroma cells are much enlarged and resemble decidua or sarcoma, but a distinction exists, for in decidua the nucleus stains poorly and there is exudate between the cells. In endometritis glandularis the epithelium is often larger and often higher, and resembles cervical epithelium, but the nucleus is always central. Hypertrophy of glands does not lead to much thickening of mucosa.

Hyperplasia leads to thickening of mucosa and is most marked in fungoid endometritis, which is hyperplastic, glandular, ectatic.

At the menopause the endometrium becomes thin, the glands become smaller, the stroma undergoes atrophic changes. Small cysts may be present, for the epithelium is pale and becomes loosened from its wall, and finally spaces are present which are filled with cell detritus. On absorption of this cell detritus we may have only cell spaces. This normal change, occurring at the climacterium, may in some instances lead to the healing of a glandular hyperplastic endometritis.

SYMPTOMS

The symptoms associated with involvement of the endometrium are subjective or objective. The subjective symptoms associated with circulatory, nutritional, or inflammatory involvements of the endometrium are bleeding, pain, fluor, or combinations of these.

Subjective Signs.—For clinical reasons, therefore, endometritis has often been divided into *endometritis hemorrhagica, endometritis dysmenorrhœica,* and *endometritis catarrhalis.* Inasmuch as bleeding and pain may be due to other conditions than endometritis, and as fluor may come from the vagina or cervix, errors are readily made by the use of these terms which are based purely on symptoms. On the other hand, certain forms of endometritis which have typical objective characteristics are called endometritis gonorrhœica when gonococci are found on examination, endometritis exfoliativa when endometrial membrane is thrown off at menstruation, and endometritis fungosa when examination by the sound shows an overgrown fungoid lining in the uterus. For therapeutic reasons it is better to diagnose changes as either *non-inflammatory or inflammatory,* and to pay additional attention to objective symptoms in the examination of the uterus and its lining.

An obstacle to the proper understanding of the question of endometritis is due to the fact that to many endometritis always implies *hemorrhage.* In certain forms *bleeding* is a symptom. When menorrhagia is the only symptom corroboration of the diagnosis of endometritis must be gained from an objective examination and all other various possible causes of intrauterine bleeding must be taken into consideration and excluded. The bleeding which is

a symptom of endometritis is generally a menorrhagia. Menorrhagia is much more frequent than metrorrhagia. It is noted that menstruation gradually comes on more profusely and the bleeding lasts for progressively longer periods, often for even ten or twelve days. Bleeding may occur, then, every two or three weeks, and at times may be intermenstrual, especially after exertion. Patients may bleed severely, the blood simply flowing away, and large pieces may be lost. In many instances the patients recover slowly from the loss of blood and a state of chronic anemia not infrequently results. This menstrual bleeding implies conditions which increase and lengthen the congestive hyperemia, or conditions which do not cut the hyperemia short. Bleeding is most frequent with the glandular hyperplastic fungoid involvement of the endometrium. Such a non-inflammatory change is due to, and is associated with, congestion and hyperemia, and bleeding readily occurs. Exudation of blood into the mucosa may be so marked as to deserve the name of apoplexy. Associated with the changed endometrium are often subinvolution of the uterine wall, or degenerative or atonic changes in the uterine muscle, and fibrotic alterations of the uterine wall. These changes imply altered muscle and elastic fibers and a lack of uterine contractility or uterine atony. Such uteri fail to cut the menstrual hyperemia short and the overgrown mucosa lacks elasticity and control over the capillaries.

Bleeding may further occur with acute inflammatory infection of the tubes, of the parametrium, or of the perimetrium. This may mean either marked uterine hyperemia or a uterine inflammatory endometritis with hyperemia. The greater and the more intense the hemorrhage and the longer the hemorrhage lasts after inflammation about the uterus subsides, the more does the bleeding speak for an actual inflammatory involvement of the endometrium, and this is generally associated with involvement of the uterine wall and is accompanied by congestion produced by the periuterine inflammation or by periuterine exudates. Bleeding which occurs with chronic inflammation of the endometrium is usually due to involvement of the uterine wall, or to congestions produced by periuterine inflammation and exudates. Here, again, we have conditions which increase and lengthen menstrual hyperemia. Here, again, a lack of contractility and elastic power in the uterine wall furnishes conditions which do not cut the hyperemia short.

In the non-inflammatory hyperplastic forms of endometrial involvement, if bleeding is excessive, *pain* may appear with the first outpour of blood, and is then due to the fact that the blood is poured out in large amounts and becomes clotted, so that marked contraction of the uterus is necessary to force it through the cervical canal. Here pain occurs with the expulsion of each clot. Through overgrowth of the mucosa at the internal os, or through inflammatory swelling of the cervico-uterine mucosa at the internal os, an acquired obstruction to the outflow of blood may cause dysmenorrhea, but acquired uterine pain is usually a symptom associated with an inflammatory involvement of the endometrium or of the uterine wall. It may begin eight days before menstruation, when the menstrual congestion first takes place. There is a feeling of pressure in the pelvis, a feeling of fullness and weight, a desire to go to stool, and a frequent desire for micturition; there is pain in the back and legs and the consciousness of the existence of a uterus. This group of symptoms is very frequently noted with those involvements of the endometrium which are inflammatory in their nature. The important characteristic of these pains is that they occur also at the menstrual period, or only at the menstrual period.

Uterine pain has the character of labor pains. There is also a sensation of pressure and bearing down. Pain is generally felt in the uterus, but not infrequently in the region of the umbilicus or sometimes near the ribs. The pain is frequently felt in the uterus a day or two before menstruation. It is due to contraction taking place in a uterus whose endometrium or wall is inflamed. The pains may occur between menstrual periods, and are then generally due to accumulation of secretion within the uterus. A point which speaks in favor of an inflammatory etiology is that this uterine pain first comes on after marriage. Any uterine dysmenorrhea which becomes worse after marriage, or which is first acquired after marriage, is, in the vast majority of cases, the result of an inflammation of the endometrium or of the uterine wall.

Bleeding and pain are symptoms which belong also to other conditions than inflammation, but *discharge or fluor* is a proof of infection. The discharge may be seropurulent or purulent, or, in chronic cases, it may form a thin watery fluid of purulent appearance. Often the secretion is very slight. The largest amount is observed in gonorrhea in pregnancy. Fluor has a tendency to

increase before and after menstruation, but sometimes may stop entirely for varying periods. Mucoid fluor always means discharge from the cervix. Pure pus, if the vagina be excluded, comes from the uterus. It is necessary to distinguish, by the aid of the Schultze tampon, between secretion from the vagina and secretion coming from the cervix or uterus. Care must be taken in this event, for erosions stain the cotton a light yellow. In distinguishing between cervical and uterine discharge on the Schultze tampon, we may say that if mucus and pus are well mixed, the combined secretion probably comes from the cervix. If pus and mucus are not mixed, and if there is much more pus than mucus, the corpus of the uterus is also involved. The absence upon the tampon of cervico-uterine secretion of a pathologic nature is no proof that fluor does not exist, and additional examination should always be made before and after menstruation. Fluor or discharge is a frequent symptom of involvement of the endometrium, and, of course, when met with, indicates an inflammatory invasion of the uterine lining. It is most frequently associated with cases of gonorrheal origin, and is then especially marked during pregnancy. It must always be suspected that all stubborn uterine catarrhs which persist after treatment are of gonorrheal origin, even if we cannot find the gonococci in the discharge and even if the uterine adnexa and the periuterine tissues are normal. It must be considered an axiom, that simply the absence of gonococci on microscopic examination of a purulent or catarrhal uterine discharge never excludes gonorrhea.

Pre-menstrual Symptoms.—There may be a sensation of pressure or a feeling of swelling in the genito-urinary tract. The patients seem conscious of the presence of a sensitive uterus. There is a desire for frequent urination; there is a sensation of pressure in the rectum, there is pain in the back and in the legs. These symptoms are related to menstruation and its associated congestion. There are other symptoms of a general nature. The patients are nervous or tired or excitable. They have a restlessness that is sometimes maniacal. There is palpitation of the heart; there is change of temperament, which is marked. They are mentally upset and changeable, sometimes melancholy. These symptoms are exaggerations of the complaints which even healthy women feel at this time. While such symptoms are not infrequently found

without metritis and without inflammatory tubal and ovarian diseases, they occur most frequently in women suffering from catarrhal endometritis, in whom, be it said, metritic, tubal, and ovarian changes often escape detection on bimanual examination.

Objective Signs of Endometritis.—Examination of the uterine cavity by the sound often shows, with involvement of the endometrium, an enlarged cavity. (This may also be observed with uterine polyps, after abortion, with subinvolution, and with uterine atony.) The lining of the uterus may seem thick and soft; it may bleed on the use of the sound. Excrescences, when present, are most often felt in the fundus and tubal corners. The excrescences are most marked with the fungoid form of endometritis. The lining of the uterus may seem rough to the examining sound (also with carcinoma, retention of decidua, etc.). On the other hand, the endometrium when involved is often smooth, especially with the inflammatory atrophic forms, and even in some cases of the diffuse hyperplastic form. Fungoid endometrium bleeds easily on the use of the sound. On the other hand, the introduction of this instrument is not infrequently accompanied by pain. As a rule, this symptom of pain on the use of the sound means an inflammatory involvement. (There are cases, however, in which the reaction of pain to the use of the sound is due to a hyperesthesic state.) The pain felt on the use of the sound may be noted in or near the umbilicus or the back, and this fact must be taken into consideration. If due to endometritis and not to perimetritic conditions, the pain is noted when the sound enters the uterus, and not when, by moving it, the uterus is also moved.

VARIETIES

Endometritis Fungosa.—Fungoid or hyperplastic glandular endometritis implies an overgrown mucous membrane. The change is of a glandular character and diffuse. Endometritis fungosa means endometrium so overgrown and thick that it projects above the surface of the uterus. It feels thick and mossy to the sound and large amounts are obtained by the curet. If no interstitial changes occur, it is simply a *hyperplasia*, especially of the glands. It is in contrast to the purely interstitial forms, where atrophy is the rule. In the purely hyperplastic non-inflammatory form the only symptom is menorrhagia. Dysmenorrhea and dis-

charge are absent. The cavity of the uterus is enlarged and the use of the sound is not accompanied by pain. The use of the Schultze tampon shows no discharge. There is no parametritis, perimetritis, or tubal disease, and there are no other evidences of inflammation. There is usually a history of previous abortion or evidences of subinvolution are noted. This condition may be present in virgins as a result of over-stimulation by the ovarian secretion, or as a result of failure of trophic control over the endometrium by ovaries involved by the diseases of children. Displacements are a factor only if congestion is present dependent on poor circulation, subinvolution, etc., as is also the case with normally situated uteri. Since the uterine lining is a lymphoid tissue, is quite possible that in the so-called lymphatic constitution the uterine lining may undergo hyperplastic changes as a part of a general condition of lymphatic hypertrophy. This may explain the hyperplasia of the mucosa and menorrhagia present in young girls without apparent cause. In addition to the purely glandular form, we have a glandular and an interstitial, which means either inflammation added on to an endometrium involved in glandular hyperplasia or else the glandular hyperplasia is due to the congestion which is associated with an active inflammation of so acute or deep a nature as to involve the uterine wall or the adnexa or the periuterine vessels and so cause a permanent congestion in the uterine lining, for congestion is the important element in the production of *hyperplasia of the endometrium.* The endometrium often feels rough to the sound. Excrescences may be felt.

Sapremic Endometritis.—There may be a saprophytic involvement of the uterine lining by bacilli, by bacteria, by cocci, and the proteus vulgaris, which grow on dead material represented by placenta, decidua, degenerating tumors, carcinoma, etc. In puerperal endometritis Krönig examined one hundred and seventy-nine cases; fifty were due to saprogenic bacteria, generally cocci, the so-called putrefactive bacteria. They do not grow on healthy tissue or in the blood. Krönig never found them with streptococci or staphylococci. In the putrid form of endometritis the necrotic tissue is separated from healthy tissue by granulation. The necrotic area is thrown off, the round cells are absorbed and normal mucosa returns. The discharge is foul-smelling. Temperature and rapid pulse are present. The condition is an intoxica-

tion by the ptomaine products produced by the saprophytic bacteria. These do not grow on living tissue.

Septic Endometritis.—Acute septic endometritis is characterized by fever, discharge, and other evidences of pelvic inflammation, and occurs after abortion, labor, operations, curettings, and intrauterine manipulations. The earlier the onset of fever and pain, the more severe it is. The deeper into the uterine wall the affection extends, the more severe it is. If it is limited to the mucous membrane, even if streptococci are found in the lochia, there is euphoria. The pain comes on with involvement of the peritoneum or parametrium. There is a purulent discharge which has no odor unless saprophytes are present. The course is simple if limited by granulations under the decidua. The course is severe if the infection extends deep into the uterus, into the lymph-spaces, into the lymph-spaces of the parametrium, or if there is thrombophlebitis or if the general circulation is involved. Among the changes occurring in the uterine wall are either metritis dissecans, intramural abscess, or chronic metritis. Infection by the gonococcus must be excluded by repeated examination.

Gonorrheal Endometritis.—The infiltration occurring in this inflammation is often observed only in isolated areas and mostly around the glands. There is often an added exudative inflammation. The surface epithelium is gone in many places and the glands show inflammatory growth. The mucosa is thickened, the surface is rough, and there are small overgrowths. There is a marked interstitial inflammation with very great pus and round-celled infiltration. There is a purulent secretion. Its irritating action causes burning, ulceration, secondary changes, and soreness in the vulva. If it invades the uterine wall, there is acute metritis. The uterus is enlarged and sensitive. The portio is swollen. There is a sensation of weight and pain in the pelvis. There is a vaginitis granulosa and a papillitis.

In younger women or in women with tender epithelium and in pregnant women the term gonorrheal endometritis is used, in contradistinction to the term catarrhal endometritis, when the examination of the uterine discharge gives positive evidences of the presence of gonococci. Here the process is one which is fresh or still active, and is often, unfortunately, kept active by intrauterine treatment. Very frequently there is a deeper involvement

than in the ordinary superficial infection. There are many cases where the inflammation is superficial, has become quiescent, and restoration to the normal is beginning. No gonococci can be found, but, in addition to pus cells and epithelial cells, squamous cells may be present. To this form, of necessity, the term catarrhal endometritis is given. In endometritis gonorrhœica the gonococci have been found or are still found. The affection of the endometrium, then, in many cases is of secondary importance, for there are complicating conditions, such as salpingitis, pyosalpinx, parametritis, peritoneal and ovarian involvements. In such cases gonococci may be found for weeks and months in the uterine discharge. The symptoms of the acute stage are those of a mild or diffuse pelvic peritonitis and the periuterine symptoms dominate the situation.

Catarrhal Endometritis.—This is characterized by hyperemia and infiltration. There is a secretion of a seropurulent character. There are pre-menstrual symptoms. Menorrhagia is rare. Dysmenorrhea, in the superficial involvement of the endometrium, is seldom a symptom, but it is more marked with the deeper involvements of the mucosa or with involvements of the uterine wall. There are no excrescences, no pain to the sound, with *superficial involvement*. The Schultze tampons should be used and are of importance in the diagnosis. Periuterine alterations should always be looked for, and are frequently found on repeated examiation or on examination under narcosis. It cannot be denied that a catarrhal endometritis may be due to non-virulent streptococci, staphylococci, bacterium coli, or to saprophytes. There may result an inflammation of a subacute form, subsequent to an acute septic involvement. In other cases it is possible that these bacteria from the beginning have been of a mild saprophytic type. It is the natural tendency to incline to this view and to exclude the gonococcus as an etiologic factor when repeated examinations show no gonococci, and especially if the periuterine structures seem normal. I believe, however, that most persistent uterine catarrhs, except such as follow acute septic infection, and such as come on at or after menopause or on the retention of fetal tissues, especially if they resist conservative treatment, even if no gonococci are present, are originally gonorrheal in their etiology. I therefore believe that the vast majority of cases of catarrhal endometritis this side of the climacteric period are to be referred to mild superficial gonor-

rheal infection, by supposed or objectively cured diseases of the prostate.

Endometritis Dysmenorrhœica.—If accompanied by menorrhagia and fluor, attention is readily drawn to an involvement of the endometrium. This condition may be present without menorrhagia, but is often accompanied by fluor. Sometimes there is neither hemorrhage nor fluor, but only nervous symptoms. Endometritis dysmenorrhœica is that form in which there is an interstitial exudation, but the objective evidences of inflammation are not so marked as in the other inflammatory forms. Menstruation is painful and the use of the sound causes pain. The pain felt in this condition is to be attributed to the exudative process. It is probable that many of these cases are simply the inflammatory form with a minimal amount of discharge. Endometritis dysmenorrhœica, as a rule, implies inflammation.

Senile Endometritis.—Beyond the climacterium occurs an endometritis accompanied by bleeding and disagreeable fluor, symptoms which resemble carcinoma. A non-resistant endometrium permits the growth of saprophytic bacteria, and the condition is comparable to the vaginal state in senile vaginitis of older women.

Endometritis deciduæ is an inflammation of the endometrium occurring during pregnancy, and producing symptoms which are most marked in the first half of pregnancy. The symptoms are fluor, bleeding, and pain. The bleeding begins early and may last for weeks or months. The blood is mixed with mucus. The discharge is purulent, especially with gonorrhea. It is sometimes watery, furnishing the form known as hydrorrhœa uteri gravidi. The Schultze tampon should be used. Pain is frequent; it takes on the character of uterine contractions and may last for months. This primary condition often gives symptoms before pregnancy, and abortions are frequent. The expelled particles, when examined, show inflammatory changes.

Membranous Endometritis.—Membranes thrown out by the uterus are (1) unorganized, *i. e.*, fibrin membranes thrown out with symptoms of dysmenorrhea; (2) organized membranes thrown out with dysmenorrhea and representing larger or smaller parts of altered uterine mucosa. They are smooth on their inner surface and show the openings of the glands. On the external surface where they are torn off they are irregular. They

give the general picture of interstitial exudative endometritis with small round-celled infiltration. Sometimes we get a picture of combined interstitial and glandular increase. In the more severe forms where the uterine lining is thrown off in the form of a membrane, inflammatory evidences by the microscope are also present, and it is probably well to consider all these changes as the result of bacterial involvement either during childhood or at a subsequent stage. The exudative swelling is the probable cause of expulsive efforts on the part of the uterus. There are generally small round cells present. There are sometimes large cells, which look like decidual cells. It is then hard to diagnose from the decidua of pregnancy, but the change in this membrane is not so regular as in decidua and the framework between the cells is not so homogeneous, but is finely fibrous and loose and the glands are generally compressed. Dysmenorrhea membranacea is rarely diagnosed now, for formerly this name was given to what we now know to constitute a throwing off of decidua after abortion or with ectopic gestation. The real cases are such as at every menstrual period throw off with marked pain a membrane of the character of uterine mucosa altered by inflammation. It is difficult to cure and curettage must be done.

SEQUELÆ

The results of involvement of the endometrium take various forms. If there is abnormal secretion it may have a bearing on the location of the ovum, if it be embedded at all. Altered character of the endometrium is probably responsible for that embedding of the ovum in the lower end of the uterus which results in placenta prævia. If the endometrium, as the result of chronic inflammation, is smooth and atrophic, it cannot readily accommodate the embedding of the ovum, or else the change to decidua is not a normal one. Therefore involvement of the endometrium may prevent conception, may prevent embedding, may be the cause of sterility or the cause of habitual abortion. Sterility is frequently the result of the inflammatory atrophic form. The most frequent involvements of the endometrium are those associated with discharge and dysmenorrhea. With the chronic hyperplastic form, in which bleeding is so frequently a symptom, sterility is not the usual result. Here, because of the congestive hyperemia and ready bleeding, we

are frequently concerned with single and repeated abortions at a very early stage.

TREATMENT

The treatment of acute septic endometritis demands rest in bed, fluid diet, attention to the bowels, and the usual sustaining and antipyretic treatment associated with pelvic inflammation. An ice-bag or ice-coil should be applied to the abdomen and short, very hot vaginal douches of ½ per cent. lysol should be given several times a day. Locally, treatment demands the very careful use of intrauterine douches given with a double-running catheter. These douches may consist of 1 per cent. lysol or of dilute acetic acid, 2 ounces to each quart of water. Internally the use of fluidextract of ergot 30 minims, or, better still, of ergotol 15 minims, or of ergotin 2 grains, from four to six times daily, is advisable to contract the uterine wall and to prevent or limit by this means the rapid extension of the invading micro-organisms into the lymphatics of the uterine wall. When a septic endometritis spreads out and involves the parametrium or the tubes, or the peritoneum or the general circulation, the condition is no longer an endometritis and surgical considerations are often essential.

The treatment of sapremic endometritis demands removal by the dull curet or by the finger of adherent necrotic fetal or maternal tissues.

The treatment of acute gonorrheal endometritis demands rest in bed, fluid diet, and daily short hot douches of bichlorid of mercury 1 : 10,000 to 1 : 5000, alternating with hot douches of ½ per cent. acetate of aluminum several times a day. The ice-bag should be applied to the abdomen or the ice-coil should be used. The associated vulvitis or urethritis or other complications should be treated according to the methods explained under those headings (see Gonorrhea). A very long period of rest in bed is essential and the patient should not be permitted to get up until she has been free of temperature for at least two weeks. With every acute gonorrheal endometritis there is associated more or less metritis and, in the vast majority of cases, extension to the connective tissue, tubes, or peritoneum. Long continuation of temperature with great pain and distention, etc., speak for peritoneal involvement. With high temperature and marked pain, repeated careful local

examination is essential, for connective-tissue, tubal, and peritoneal complications may demand surgical intervention.

The treatment of chronic gonorrheal endometritis is given in the section on Gonorrhea (p. 509).

In "endometritis" we are dealing with a uterine lining, altered in character and structure, sometimes associated with atrophy of the mucosa, ofttimes with hyperplasia of the mucosa, and evidencing either inflammatory changes or no inflammatory changes. We are also concerned in many cases with a uterine cavity larger and more roomy than normal. Hand in hand with these alterations of the mucosa are alterations in the character of the uterine wall. The uterine wall may be altered as a result of inflammation. Without inflammation the uterine wall may be thickened and congested, or it may be thickened as a result of hypertrophy of the muscle fibers or increased growth of the fibrous connective tissue or change of the elastic fibers to fibrous bundles. The capillaries and blood-vessels of the mucosa may be dilated and greatly increased in number, the vessels of the uterine wall may be congested or dilated, and there frequently exists about the uterus dilated arteries and veins, or else changes of an inflammatory nature are present.

Hence the symptoms are excessive menorrhagia or a discharge due to congestion or to inflammation, or pain due to the uterine contractions of a sensitive uterus expelling secretions of the mucosa, or there may be dysmenorrhea due to the congestion occurring in an inflamed uterus or to obstruction to the outflow of blood.

The treatment of endometritis depends upon the cause, upon the symptoms, and on the result which it is desired to obtain. The medical treatment of hyperplastic endometritis is directed to the treatment of the menorrhagia or the metrorrhagia. It implies the use of ergot, ergotol, or ergotin, of hydrastis or hydrastinin hydrochlorate, of stypticin, styptol, of suprarenal extract, adrenalin, or ferropyrin and the hot-water bag applied to the lower vertebræ. Irregular bleedings which occur if decidua is left behind after abortion, and bleedings which occur on the presence of overgrown or polypoid endometrium or which continue after the medical treatment of hyperplastic endometritis, demand the use of the curet.

In dealing with a hyperplastic endometrium whose only symptom is bleeding, we are concerned with the use of internal remedies, the best of which is stypticin. Stypticin should be given in doses of 2

to 4 grains several times a day, beginning two or three days before menstruation, and continued during menstruation. A very good combination consists of ergotin 2½ grains, stypticin 2½ grains, and suprarenal extract 2½ grains in capsules, given four to six times a day. Between menstruation, especially if the uterus is enlarged or the cavity is enlarged, ergotol 15 minims, and fluidextract of hydrastis 15 minims, should be given four times a day. A regular course of sitz-baths 70° to 85°, five to fifteen minutes is valuable. In cases in which the loss of blood is very marked, or in which the menorrhagia goes over into metrorrhagia or irregular bleedings, curetting, with or without atmocausis, must be done. (See Uterine Bleeding.)

With endometrial hyperplasia there often comes a time when the curet is necessary. The use of the curet may be followed later on by the application of 10 to 20 per cent. chlorid of zinc, or 10 to 20 per cent. pure tincture of iodin or 50 per cent. carbolic alcohol. Care should be used in introducing these fluids into the uterus, for they readily pass into the tubes. It is better to use cotton rolled on a Playfair sound or to introduce into the uterus a syringe with its tip covered with cotton, and then to slowly inject the fluid so as to moisten the cotton covering. Even curetting fails to cure the bleeding in a fair proportion of cases. The use of intrauterine medicated suppositories is dangerous if cauterizing drugs are used, because of the possibility of causing a stenosis.

An inflammatory endometritis not associated with severe bleeding should not be curetted. It is wisest to treat these cases without intrauterine manipulation. Some treat them, however, by dilatation of the cervix with Hegar dilators or with sounds, and daily intrauterine irrigations with 1 per cent. lysol, 1 to 2 per cent. carbolic, 1 : 3000 sublimate, or ½ ounce of Lugol's solution to the quart. These irrigations are then done two or three times a week. Later on, with a wide cervical canal the uterus may be irrigated and tincture of iodin or 5 to 10 per cent. chlorid of zinc may be applied. In other instances medicated sticks containing 10 per cent. iodoform or 2 to 5 per cent. protargol may be introduced into the uterus two or three times a week.

Much is taken for endometritis which is really nothing more than natural change produced by premenstrual congestion. When the mucosa is chronically congested in association with descent or displacement of the uterus, or through inflammation in the adnexa,

or through primary endometritis, overnourishment of the glands may lead to their hypertrophy. Excess of function results in the increase of discharge, which is thus one of the most constant signs of inflammatory endometritis. The menstrual flow may come on earlier and last longer than normally and may become irregular. Even if curetting results in a temporary improvement, the condition recurs so long as the congestion and inflammation persists, especially so if the congestion or inflammation has at the same time altered the character and stucture of the muscular wall.

My usual method is the use of glycerin in the vagina, well applied with the aid of gauze. A very good aid consists in the use of daily vaginal douches of several quarts of cold water, beginning first with tepid and gradually cooling it down in the course of weeks. When continued for weeks, they have an excellent effect on the uterus. In other cases the use of steam may be followed with fair results. In the treatment of acute and subacute gonorrhea, although some dilate the cervix and make use of the above method, it is wiser to use no intrauterine treatment. Every stubborn uterine catarrh which resists conservative treatment is possibly gonorrheal. We then depend on the use of the cold douche cure, the administration of sitz-baths to produce temporary hyperemia, the use of tonics, and such an arrangement of the patient's routine as will prevent congestion. (See also pages 510, 511, 512, 513.)

For the treatment of pre-menstrual symptoms bromids are the best, given in the dose of 10 grains of strontium bromid in water four to six times a day. In extremely excitable cases hyoscin hydrobromate, $\frac{1}{200}$ of a grain, may be given three times a day. Its effects should be watched, as some patients are extremely susceptible to the drug. For the treatment of *pain* see Dysmenorrhea.

For senile endometritis intrauterine irrigations with lysol solution or 1 to 2 per cent. carbolic acid, with treatment of the associated vaginitis with pyroligneous acid, should be carried out.

For endometritis membranacea the internal administration of ovarin and iodid of potash should be continued for a long time. For the pain experienced at menstruation the drugs mentioned under dysmenorrhea, and consisting mainly of the coal-tar products, should be used. A thorough curetting followed by the use of steam is the best form of treatment for endometritis membranacea.

INFLAMMATORY METRITIS

1. Bacteria may thrive in the uterine cavity in puerperal affections, after operations or artificial abortions.

2. The introduction of pyogenic bacteria into the uterus in non-puerperal conditions may produce acute infection, if at the same time we have an injury to the endometrium.

3. Gonococci can grow in the healthy tissue of the endometrium, though their activity is increased by curettage, labor, and especially by abortion.

Acute Endometritis after Labor, etc.—The course of an acute endometritis occurring after labor, after operations, after the use of the curet, or subsequent to artificial abortions may be limited and held within bounds by granulations in the endometrium or the decidua. There may, however, result deeper involvement, producing intramural abscesses or numerous miliary foci or chronic diffuse metritis.

Septic pyogenic endometritis is due to streptococci, staphylococci, and the bacterium coli. Involvement may be superficial. It is characterized by round-celled infiltration. A granulation area is formed under the necrotic tissue. If the granulation area is strong enough, there is no deep invasion. Otherwise the septic involvement extends into the muscularis. When recovery takes place there is formed intramuscular connective tissue and induration results.

Gonorrheal Involvement of the Endometrium.—Gonorrheal involvement of the endometrium is characterized in the acute stage by an interstitial involvement with small-celled infiltration. The glands are filled with secretion and epithelia and the interstitial tissue consists of closely grouped small cells and round cells and smaller round pus cells. Madlener found gonococci in the infiltration foci of the muscularis, which proves that the muscular changes are not due to the bacteria or cocci of a mixed infection. If gonococci are in the uterus, according to Wertheim, they may

invade the uterine wall and cause an acute metritis with enlarged uterus, sensitive uterus, red swollen portio, pain and weight in the pelvis, erosions of the cervix, and granular vaginitis. Chronic metritis may be the result of acute cases as above, in which event there is a history of such a condition. Gonorrheal endometritis post partum often causes few symptoms, and the rise of temperature associated with it is slight or minimal. Krönig examined one hundred and seventy-nine cases of puerperal endometritis and found gonococci in the lochia of fifty. Wertheim took five cases of fresh gonorrhea in whom the adnexa were normal and in whom there were no subjective symptoms of an affection of the endometrium. He curetted particles from the corpus mucosa, examined the sections, and found gonococci in them all. Chronic metritis may result from an involvement which was never acute.

Wertheim finds that the uterus in chronic gonorrhea is enlarged, the wall is thickened and hard, and the mucosa is thickened to 5 mm. Microscopically there is a great infiltration by pus and round cells, either diffuse or in spots around the glands. There is edema of the interstitial tissue.

Inflammation in the Connective Tissue and in the Muscularis.—Inflammation occurs in the connective tissue between the muscle bundles. Such inflammation comes from the endometrium. In acute inflammation there is an accumulation of leukocytes. The muscle bundles are forced apart by serous exudation and a doughy swelling of the uterus results. Chronic inflammation leads to the development of connective tissue between the muscle fibers, which then gradually become atrophied. The uterine wall is finally much thickened by connective tissue and forms a hard mass. An important consequence is lack of contractile power on the part of muscle fibers and the presence of an excessive amount of connective tissue. Such conditions complicate very many cases of endometritis, gonorrheal and catarrhal, and are more responsible for the symptoms and annoyances than are the changes in the endometrium.

In every case of inflammatory metritis we have an associated inflammatory endometritis. In other words, with many cases of endometritis the uterus is so involved as to constitute a metro-endometritis. The very fact that an acute involvement extends

into the muscularis makes the acute disease more grave and more lasting and renders a chronic condition less amenable to restoration to the normal. In addition to the fluor and pain of a chronic inflammatory endometritis, there is such an alteration of the muscular wall as renders menstruation more profuse, of longer duration, and often of an irregular character.

There is a feeling of weight in the pelvis, the portio is thickened and the uterus is enlarged. There are erosions, hypersecretion, uterine fluor, irregular bleedings, either menorrhagia or metrorrhagia, especially in the cases which were once acute.

TREATMENT OF METRITIS

The treatment of acute metritis is like that of acute endometritis, but more prolonged. Rest in bed, the use of the ice-bag or the ice-coil, fluid diet, attention to the bowels, the sustaining and antipyretic treatment usually carried out in fevers. Short hot vaginal douches should be made use of several times a day and should consist of 1 : 10,000 or 1 : 5000 bichlorid or ½ to 1 per cent. lysol. With most careful precautions there should be given daily one or two intrauterine irrigations with a double-running catheter in post-partum or abortion cases. These irrigations may consist of very mild solutions of bichlorid of mercury or very weak carbolic acid solution, but best of all is 1 per cent. lysol, or dilute acetic acid 2 ounces to each quart of water. Internally ergotol 15 minims or ergotin 2 grains should be given four to six times a day. This treatment applies to septic metritis and not to gonorrheal metritis, unless the latter is post partum.

The treatment of gonorrheal metritis is rest in bed, the use of vaginal douches, etc., as prescribed under gonorrheal endometritis. Because of its importance, I repeat the essential points.

The treatment of acute gonorrheal metro-endometritis demands rest in bed, fluid diet, and short hot douches of bichlorid of mercury 1 : 10,000 to 1 : 5000, alternating with short hot douches of ½ per cent. acetate of aluminum several times a day. The ice-bag should be applied to the abdomen or the ice-coil should be used. The associated vulvitis or urethritis or other complications should be treated according to the methods explained under those head-

ings (see Gonorrhea). A very long period of rest in bed is essential and the patient should not be permitted to get up until she has been free of temperature for at least four weeks. With every acute gonorrheal endometritis there is associated more or less metritis, and in the vast majority of cases there is extension to the connective tissue, tubes, or peritoneum. Long continuation of temperature, with great pain and distention, etc., speak for peritoneal involvement. With high temperature and marked pain, repeated careful local examination is essential, for the connective tissue, tubal and peritoneal complications demand surgical intervention.

In the treatment of chronic metritis the patient should lead a life free of effort and lifting and all physical strain should be avoided. Coitus and other conditions which increase the congestion should be eliminated. Daily douches should be taken of several quarts of hot water, making use of bichlorid of mercury 1 : 10,000 to 1 : 5000 or lysol ½ per cent. or some of the astringent powders, such as alum, or tannic acid or sulphate of zinc 1 dram to each quart of water. The associated erosions should be treated by direct application of carbolic acid, followed by the application of tincture of iodin, as described in the section on Cervical Catarrh. For the uterine congestion and inflammation glycerin treatment is the best. This is carried out by the use of glycerin (boroglycerin or 5 to 10 per cent. ichthyol-glycerin being used). Glycerin acts well when applied in large amounts. It is better applied as follows: With the bivalve speculum in place, and after cleansing of the fornices and the treatment of the erosions, 1 or 2 ounces of the glycerin is poured into the vagina, and then a long strip of sterile gauze, 6 to 8 inches wide and a yard long, is thoroughly packed first into the posterior fornix and then into the other fornices and then into the vagina, after which the speculum is removed. This is allowed to remain in place for twenty-four hours, during which time the patient wears a vulvar pad, for the amount of fluid extracted by the glycerin is very large. The strip of gauze is removed at the end of twenty-four hours and is followed by a douche of the above-mentioned drugs or by a vaginal douche containing a dram of acetate of aluminum to each quart of water. This application of glycerin should be carried out three times a week, and the hot vaginal douches should be taken twice every day, except during the twenty-four hours when the gauze is in place.

Rest in bed during menstruation is very essential, and short hot douches should be ordered during menstruation.

For the bleeding, stypticin, 2 grains in capsules four to six times a day, should be taken, best begun two or three days before the bleeding is expected, if the time can be gaged. With the stypticin 2 grains of ergotin and 2 grains of suprarenal extract may be combined. Between menstrual periods ergotol, 15 minims four times a day, should be given, or ergotin 2 grains plus hydrastinin hydrochlorate ½ grain should be given in capsules four times a day. Curetting should not be attempted in metritis unless the bleedings are so profuse as to endanger the patient's health. Curetting should then be followed by the use of steam, in the manner explained in the section on Atmocausis.

In the treatment of chronic metritis (due to bacteria), associated with congestion, infiltration, edema, but before the formation of new connective tissue and sclerosis, heat is used only if there is no pus about the uterus. Hot Priessnitz bandages are used, hot coil, hot-water bags, warm sitz-baths, hot vaginal douches. In the late stages, when sclerotic changes are prominent and menorrhagia and metrorrhagia are marked, sitz-baths and douches which produce pelvic anemia are substituted and scarification with suction may be used. If there is no metrorrhagia or menorrhagia Nauheim baths with an after-cure are advisable.

Inasmuch as the treatment of chronic metritis implies also the treatment of chronic catarrhal or gonorrheal endometritis, it is well to state that some treat these conditions by intrauterine applications or irrigations. Hence the reader is referred, in this connection, to the treatment of chronic gonorrhea as made use of by Bumm, Boldt and others, in the section on Chronic Gonorrhea (pages 510, 511, 512, 513).

Cases of chronic metritis are eventually, but not temporarily, relieved of the sense of weight and discomfort in the pelvis and of the pain experienced between menstruation by the use of sitz-baths containing 2 to 3 pounds of sea salt and 3 to 4 ounces of calcium chlorid taken for a period of fifteen to twenty minutes before retiring at a temperature of 90°. In place of the bath, the abdomen may be covered all night with a wet cloth over which oiled silk and chamois is applied and kept in place by an abdominal binder of muslin, or a long, wide towel, or Neptune's girdle may be used.

The full Nauheim baths are often of marked benefit in the cases without bleedings, having the same local effect as sitz-baths, coupled with which is the general systemic benefit due to their action.

The menstrual pain associated with menstruation is treated by the coal-tar products, etc., as described in the section on Dysmenorrhea (p. 224).

PELVIC CELLULITIS AND PARAMETRITIS

Point of Origin of the Infection.—The cervical portion of the uterus in particular is embedded in and surrounded by a large amount of cellular connective tissue. This connective tissue spreads out in the form of a six-pointed star. Each arm is covered by peritoneum and contains muscle fibers, blood-vessels, and lymphatics. Thus are formed the two broad ligaments, the two antero-lateral or uterovesical ligaments, and the two postero-lateral folds of Douglas or uterosacral ligaments. The base of the broad ligaments, called the ligamentum cardinale, is particularly rich in lymphatics. The cellular tissue posterior to the cervix, lying above the posterior fornix of the vagina and underneath the peritoneum of the cul-de-sac of Douglas, is also rich in lymphatics. The pelvis, underneath the peritoneum, is lined with connective tissue, the cellular connective tissue of the pelvis. It is in direct connection with the connective tissue of the six ligaments united with the cervix. To the connective tissue of the six-pointed star, in particular, is given the name parametrium, and a further designation is added by the terms lateralis, anterior and posterior. The cellular connective tissue of the upper part of the broad ligament and along the tube and near the ovary, together with the great plexus of veins, is of the greatest importance because of its frequent and frequently unrecognized involvement.

Acute Cellulitis.—Pelvic cellulitis or parametritis is an acute, subacute, or chronic inflammation affecting the connective tissue under the peritoneum of the pelvis, but more especially involving the connective tissue situated in the broad ligaments (ligamenta lata), the vesico-uterine ligaments, or the uterosacral ligaments, the latter also being known as the folds of Douglas. An acute parametritis is a phlegmon beginning from an infected wound in the cervix. In acute parametritis streptococci are most frequently found, but staphylococci, bacterium coli, and the proteus vulgaris are also responsible, and so is the gonococcus, the latter, as a rule,

in association with other bacteria. Involvement of the connective tissue of the pelvis readily occurs, because of the numerous lymphatics present in the parametrium surrounding and connected with the uterus and cervix. In the acute form the broad ligaments are easily involved because of the lateral tears occurring in labor, and symptoms are manifested between the second and the eighth day. Injuries of the same character may occur at operation on the cervix, especially when dilatation of the cervix opens up the same avenues of approach. The uterosacral ligaments and the posterior parametrium are also involved post partum and after abortion, but usually manifest symptoms at a somewhat later period. The most severe forms of parametritis are the acute phlegmonous inflammations combined with inflammation of the peritoneum. A more frequent form is acute phlegmon without involvement of the peritoneum. It is characterized by sero-gelatinous, yellow, infiltrating exudate and by small round-celled infiltration.

The Puerperal Form.—As stated, the early puerperal form often involves the ligamentum latum and is associated with tenderness and some pain in one side, with temperature. There is soft elastic exduation with edema in its periphery, situated lateral to the uterus. There results after a few days a large tumor at the side of the uterus, extending high up into the broad ligament and over toward the pelvic wall. Since it is limited by the peritoneum of the broad ligament, its upper surface is rounded. Another frequent location is posterior to the cervix, that is, retrouterine and retrocervical, in which event the exudate also surrounds the rectum and extends into the rectovaginal septum. In this form the upper surface of the exudation may be round, when covered by the peritoneum of the sac of Douglas. If connected with the vagina, there is evidenced a flat infiltration underneath the mucosa of the posterior wall, ending on the posterior wall with a sharp edge.

Location of the Exudate.—A parametritic exudate may extend up on the anterior abdominal wall above Poupart's ligament, and may pass around the bladder and up on the anterior abdominal wall. The inguinal glands may be involved. The exudate may surround the uterus and the rectum in addition to lining the pelvis. The basic lesions are lymphangitis and venous thrombosis.

Acute parametritis in the broad ligament shows a swelling lateral

to the uterus, extending from the uterus up to the pelvic wall. If it does not extend entirely up to the pelvic wall, it is slightly movable; otherwise, not so much so. It may be irregular at its lower border, and when pus formation occurs it may project into the lateral fornix. The upper border is found and readily felt by the external hand, extending in some cases up to the level of the umbilicus. When slight peritonitis is combined, the upper border may be indefinite through adhesion of intestines. The presence of pus is marked by higher temperature, chilly feelings or chills, and by evening rises and morning remissions. If no suppuration takes place, there is temperature, but otherwise relatively little discomfort.

Differential Diagnosis.—When an exudate is situated elsewhere than in the broad ligament or retrocervically, there is formed a diffuse infiltration with many irregular extensions. When an exudate becomes smaller, the uterus resumes its normal position, the mass grows constantly harder, and most of it may be left close to the lateral pelvic wall. If so situated, the exudation is of a flat form, and when its connection with the cervix is lost may produce independent flat tumors situated on the posterior or lateral pelvic wall.

There is some difficulty in diagnosing acute posterior parametritis in its retrouterine and retrocervical location from a peritoneal exudate. Posterior parametritis is situated under the Douglas peritoneum, extends further down, is nearer the vagina, and may extend into the rectovaginal septum, even half-way down toward the vulva. It has a sharp lower end and is not movable. It may extend far laterally and may surround the rectum like a ring, making its lumen smaller, as may be found on rectal examination. On rectal examination the mucosa is not movable. A posterior parametritic exudate soon becomes hard, and when it does extend upward is round on its upper surface through limitation by the Douglas peritoneum, and only extends up a certain distance on the posterior wall of the uterus. It must be diagnosed from a peritoneal exudate in the cul-de-sac of Douglas. The latter is somewhat movable. Its lower edge is round or oval or sharply outlined by the shape of the cul-de-sac of Douglas. It does not extend far laterally. It pushes the rectum to one side, as may be found

on rectal examination. It may extend up on the posterior uterine wall to the fundus. It is relatively soft and cystic.

Symptoms.—When fresh, a parametritic exudate is soft and elastic. The symptoms are often relatively slight and may give the patient but little pain. The formation of pus is characterized by high temperature and great remissions. The pus may be foul, in which case the prognosis is worse. The pus may break of its own accord above Poupart's ligament or into the vagina, bladder, and rectum. When the exudate has become completely purulent, an incision should be made through the vagina, either into the broad ligament or into the posterior fornix. In some cases the exudate breaks down into pus only in certain spots and the disease may be long-drawn-out, lasting for weeks or months. The proportion of the exudates which go on to abscess formation is small. These are generally situated in the broad ligament or retrocervically. If no pus degeneration takes place, the exudate may be completely resorbed or may leave sclerotic tissue behind. When the early edema subsides the parametric exudate feels hard and grows constantly harder, producing pain and discomfort according to its situation.

Because of the hard character which parametritic exudates assume after the edema is gone, the older cases must be diagnosed from all hard tumors about the uterus. When situated in the broad ligaments or posterior to the cervix, they resemble in no slight degree fibroid tumors. In the broad ligaments a parametritic exudate may be firm like a fibroid, but it is more closely connected with the lateral wall of the uterus and often has inflammatory extensions, especially posteriorly into the vagina. Through the rectum a fibroid is felt to be round, while the parametritic under-surface is flat and situated close to the pelvic wall. A fibroid is movable, while a lateral parametritic exudate is somewhat movable only if it does not extend up to the lateral wall. The use of the sound shows the uterus elongated in fibroid. The symptom is pain.

A small lateral parametritic exudate may resemble pyosalpinx, and it is often hard to tell whether we are dealing with parametritis, pyosalpinx, or both. Pyosalpinx lies higher, nearer the fundus, while the parametritic exudate may lie deeper, generally in the

lower part of the broad ligament. The latter is near the cervix, may extend into the lateral fornix, is flatter and more diffuse. When the parametritis constitutes a parasalpingitis a diagnosis from salpingitis is almost impossible.

Lateral parametritis may resemble hematoma of the broad ligament, but the latter is not so diffusely hard as is the exudate. Hematoma is more round and has fewer extensions.

When existing on the right side, a parametritis must be diagnosed from a perityphlitic exudate. The latter resembles those parametritic exudates in the broad ligament which have extended up toward the pelvic wall. In perityphlitis, however, there is a different history; the exudate is not connected with the uterus; it lies near the cecum and projects out more toward the abdominal cavity.

Subacute Parametritis.—A subacute inflammation often occurs after labor or abortion, in many cases due to the presence of the gonococcus alone or associated with other bacteria or cocci, and frequently not recognized. This condition gives symptoms in the second or third week after labor. The patients do not improve in health, they have pain in the back, and at examination there is found, in addition to evidences of cervical catarrh, ectropion, etc., an induration or infiltration behind the cervix. This form involves the posterior parametrium and the uterosacral ligaments. In fact, involvement of the cellular connective tissue without cervical lacerations usually occurs in the posterior parametrium. In the early stages examination of the posterior parametrium shows a hard, diffuse infiltration like a fibroid, or sensitive edematous folds of Douglas. Very frequently there occurs after labor, abortion, or curettage a mild paraoöphoritis or parasalpingitis involving the cellular tissue along the tube near the ovary and in the ligamentum infundibulopelvicum. It produces varicocele of the broad ligament. This condition, when sclerosis takes place, is productive of pain in the ovarian region which is affected by the position of the patient. This condition with alterations in the ovary produces by no means infrequently cases of ovarian acquired dysmenorrhea.

There is a chronic, slowly progressive inflammation of the connective tissue, accompanied by sclerosis and thickening which is

known as parametritis retrahens. It is generally retrocervical, in the folds of Douglas, in the connective tissue under the Douglas peritoneum and surrounding the posterior fornix of the vagina. It may result from the above-mentioned subacute involvement post partum or after abortion which has originally produced a hard, diffuse infiltration behind the cervix and which has given symptoms. As a rule, this form produces no early symptoms which call for bimanual examination. It results from progressive infection of the connective tissue by a chronic cervical catarrh. In the early weeks after labor or abortion the posterior parametrium and the folds of Douglas may be extremely sensitive. This stage soon subsides and there results a progressive sclerosis and shortening of the uterosacral ligaments. The only symptoms are backache and the subjective and objective symptoms of a cervical catarrh. In the course of years the latter undergoes improvement, and all that is finally seen is a sclerosed posterior parametrium.

Parametritis retrahens is found in nulliparæ, but is most marked in the women who have borne one or more children. Cervical catarrh seems to select the posterior parametrium. It does not form an acute swelling or pus, but simply produces an edematous infiltration which causes at first elongated, sensitive uterosacral ligaments, and so permits the cervix to descend and often allows a bulging into the vagina of the posterior roof or fornix. In nulliparæ it simply forms a slow progressive infiltration of the posterior, cellular connective tissue. The end-result is the formation, on one side or both, of a shortened sclerotic uterosacral ligament with consequent limitation of mobility of the cervix and the production of a retrodisplacement with backache.

Parametritis Atrophicans Diffusa.—There is a parametritis of more general nature which is called parametritis chronica atrophicans diffusa (Freund), with which there is associated great atrophy of all the pelvic organs with early menopause and marked nervous symptoms. (See Hyperthyroidism.)

Diagnosis.—If chronic or subacute parametritis involves the broad ligament, there is felt just above the fornix in the base of the broad ligament a sclerotic retracting band. The diagnosis is not difficult if the sclerosis is situated in the broad ligament, for we feel the infiltration lateral to the uterus, where it is easily palpated. It is

situated just above the lateral fornix in the base of the broad ligament. If the cellular tissue in the upper part of the broad ligament and the ligamentum infundibulopelvicum are involved there results a paraoöphoritis, often with the symptoms of ovarian dysmenorrhea.

When the fingers are passed high up into the posterior fornix in a case of posterior parametritis the normal elasticity is gone and pain is produced. An attempt to push the cervix up toward the symphysis discloses lack of mobility of the cervix. The sclerotic uterosacral ligaments are felt and pain is produced, often noted in the back and in the rectum. Examination per rectum discloses the same condition and infiltration is noted about it. Parametritis must be diagnosed from perimetritic adhesions, though the combination of the two is frequent. The diagnosis is sometimes difficult. In the case of posterior parametritis we have two thick bands, representing the folds of Douglas, which pass out from the uterus at the level of the cervix, diverging externally and posteriorly. The space between the two is frequently thickened and banded. The uterus is often retrodisplaced. Mobility of the cervix is limited. Backache is a frequent symptom and is aggravated by examination. Perimetritic bands are to be diagnosed if we feel strands passing off from the fundus or from the whole posterior wall of the uterus, or if the ovaries are fixed. More than two bands exclude the uterosacral ligaments alone.

TREATMENT OF PARAMETRITIS

Not every acute parametritis ends in pus formation. Therapy consists in aiding resorption and, if this is impossible, in aiding suppuration, which is relieved by vaginal incision. Resorption occurs more frequently with post-partum exudates other than gonorrheal. The treatment of acute and subacute stages of parametritis is the same as that of acute and subacute salpingo-oöphoritis. I have often seen cases after abortion and labor, particularly those coming on from ten days to two or three weeks after labor, heal and undergo resorption after weeks, and sometimes months, of conservative treatment. The exudate is gelatinous or hard; it is diffuse. It gives no evidence to the touch of

breaking down into pus and is not associated with high temperature reactions. There is a minimum amount or else an absence of peritoneal irritation. Such cases of parametritis posterior, or especially lateralis, as are, however, associated with high temperature reactions and evidences of marked peritoneal irritation are usually such as represent a combination of parametritis with salpingo-oöphoritis and pelvic peritonitis. The size of the adnexal tumor is then hidden by the great involvement of the broad ligament or ligaments. Even here conservative treatment does well unless temperature reactions are high, pain is great, and the size of the exudate is continually increasing. Then vaginal incision removes the pus and hastens convalescence. Such cases, when treated by the abdominal route during the acute stage, readily prove fatal. The greater the localization of exudate in the connective tissue, and the earlier the occurrence of closure of the tubes, the less marked and the less dangerous is the associated pelveo-peritonitis.

The treatment of parametritis following labor or abortion demands, of course, rest in bed, fluid diet, attention to the bowels, the application of the ice-bag or the ice-coil to the abdomen. Cool or tepid vaginal douches should be given several times a day of 1 : 10,000 to 1 : 5000 bichlorid or 1 per cent. lysol. The formation of a large mass in the broad ligaments or in the posterior parametrium, associated with continued temperature, increase in size, and pain, is relieved by incision and drainage through the vagina. Many of these cases in which the exudate is hard and firm, and in which the temperature reactions are not high, may be brought to resorption without incision and drainage. Rest in bed plus the use of vaginal douches, plus the subsequent use of glycerin and gauze applied to the fornices, will bring about a fair restoration to the normal in many instances, even though this treatment takes weeks and not infrequently months. The end lesions in the majority of these cases are chronic parametritis, pyosalpinx, and perimetritic adhesions.

The treatment of parametritis chronica, most frequently of the form of posterior parametritis, is essentially the treatment of the causal cervico-uterine inflammation or catarrh, and as such is fully described in the section on Endocervicitis.

In the treatment of the chronic stage we are concerned with

involvement of the connective tissue associated with congestion and edema, or associated with a large exudate which has to go through resorption and sclerosis. The treatment of an exudate a week after the fever stage is passed consists of stimulating applications to the abdomen, hot douches of 4 quarts of water two or more times a day. If temperature returns and if bimanual examination gives evidence of softening and increase in size of the exudate, then hot douches and the hot applications should cease. If, however, resorption is taking place, and if fever is absent, abdominal and vaginal applications to produce hyperemia, followed at a later period by gentle massage after the hot treatment, are excellent. The resulting hyperemia diminishes pain, stimulates the nutrition of the tissues, increases the power of resorption, and stimulates the lymph flow. If an exudate is situated in the cul-de-sac of Douglas, we may use thorough vaginal packing of the fornices and may apply a tight abdominal binder. In the later stages, salt baths, especially in the form of warm, prolonged sitz-baths, and of Nauheim baths are of value. Edema of the parametrium readily disappears under thorough vaginal packing of the fornices, carried out in the modified Trendelenburg position. (See page 105.)

When sclerosis or parametritis atrophicans occur, with dislocation of the uterus and the adnexa, we must make use of hyperemia to alter the sclerosis of the connective tissue so that bimanual massage may then restore the ligaments to their normal length. This demands hot sitz-baths and prolonged vaginal douches, very hot, to render the shrunken ligaments hyperemic, anesthetic, succulent, and stretchable. If this is followed immediately by vagino-abdominal massage, fixations can be loosened, adhesions can be stretched, and displacements can be corrected. The occurrence of fever or pain after such treatment demands the cessation of the treatment. (See pages 107, 108, 119, 121.)

In the treatment of older cases Nauheim baths and salt baths are of value. The benefits of this method are not permanent, however, if during and after the baths mechanical stretching of the uterine ligaments is not done.

PELVIC PERITONITIS; PERIMETRITIS

Perimetritis is an inflammation of the peritoneum of the pelvis resulting in adhesions of the adnexa, intestine, or pelvic peritoneum, and especially of the uterus. It may be septic or gonorrheal, acute or subacute. It occurs most frequently as the result of the extension of a cervico-uterine inflammation through the tube or through the broad ligament lymphatics, sometimes from appendicitis and peritoneal tuberculosis.

If the tubes do not become closed and if pus is poured out, or if the infection rapidly involves the pelvic peritoneum, a peritoneal exudate results. Therefore in the acuter forms with the symptoms of peritonitis there results an accumulation of exudate of varying amounts in the cul-de-sac of Douglas, which can be readily made out only when under tension which occurs when the exudate becomes encapsulated. In the presence of much exudate the uterus is pushed forward and upward and a mass or tumor is felt back of the portio. When the exudate is encapsulated or organized its upper surface is not smooth or round, because it is formed by intestines. Often the inflamed adnexa are noted postero-lateral to the uterus, but the tubes and ovaries may be involved in the cul-de-sac of Douglas, with the peritoneal exudate. After an acute infection there may result simply adnexal tumors, more or less adherent to intestine, especially sigmoid, etc., which are usually situated postero-lateral to the uterus, or there may result adhesions which totally obliterate the cul-de-sac of Douglas, or there may be a fixed retroflexion of the uterus.

There may be adhesions passing from the posterior wall of the uterus to the pelvic peritoneum. The lower part of the cul-de-sac of Douglas may be obliterated. The fundus may be fixed by stretchable bands. As a rule, the greater the involvement of the tubes, the greater is the adhesion of the uterus to the pelvic peritoneum.

In acute infections the tubes may become quickly closed and adhesions are present mainly about their outer ends.

With the milder and the much more frequent forms of perimetritis the results are different. There has never been an acute involvement, the condition being due to infection of the peritoneum by a catarrhal salpingitis, in the vast majority of cases gonorrheal in nature. The tubes have not been greatly inflamed, they have not become distended, have not dropped down by their own weight to the floor of the pelvis. The adnexa are involved in mild adhesions; smaller or larger tubo-ovarian cysts may result and are often fixed close to the lateral pelvic wall. In many cases the adnexa may seem free on bimanual examination.

We should make a distinction between the various localizations of adhesions after any form of peritonitis. Adhesions of the tubes to the posterior wall of the broad ligaments or adhesions of the outer ends of the tubes is always present with *pyosalpinx or pyosalpingitis.*

Many infections are of a mild nature; very little discharge pours out. It results in closure of the tube-ends or in adhesions of the tube-ends to peritoneum or peritoneally covered structures. A diffuse pelvic peritonitis has not taken place and the uterus itself may be free of adhesions of any form, *i.e.*, a mild *salpingo-oöphoritis.*

If, without marked tubal involvement, the ovaries are involved, in adhesions, the term *perioöphoritis* should be used. The uterus is free of adhesions.

If the uterus on its posterior wall is held by adhesions, then the term *perimetritis* should be used. This implies the previous existence of a pelvic peritonitis or a pelvic exudate situated in the cul-de-sac of Douglas, from which adhesions result.

When the uterus itself is involved, we are really justified in speaking of perimetritis, though the term is often used to signify the various forms of adhesions in the female pelvis.

If adhesions are present on its posterior wall the uterus is more or less firmly fixed, according to whether the adhesions are extensive, long or short, dense or stretchable. Care must be taken not to confuse this condition with a retroflexion which is simply in contact with the posterior peritoneum and the rectum, and which may be difficult to replace. The uterus may be pulled back into retroversion or retroflexion by adhesions of the adnexa and by the sclerosis and shrinking of the ligamenta infundibulopelvica.

Differential Diagnosis.—A differential diagnosis between parametritis and perimetritis is necessary. All lateral tumors which have a sharp, round, lower border speak against a parametritis. In the acuter stage a lateral parametritic exudate has an upper border of a rounded character, whereas a perimetritic condition has a diffuse upper border through adhesions of the intestines, while its lower border is sharp because it is outlined by the peritoneum of the cul-de-sac of Douglas. When perimetritic bands are felt through the posterior fornix, care must be taken not to mistake for them the thickened uterosacral ligaments. If more than two bands are felt, the condition is probably a perimetritis.

In many of these cases the uterus is retroverted or retroflexed, and the pain and other annoyances from which the patients suffer are attributed to the retrodeviation. In many of these cases there is a real inflammatory endometritis and erosions and cervical catarrh are present. For that reason, too, annoying symptoms in the way of pain, etc., are often attributed to intrauterine disease when peritoneal adhesions are the important pathologic factors. The diagnosis of peritoneal adhesions is one often made by exclusion. Perimetritis is often found on operation when not disclosed by bimanual examination. Adhesions cause much misery in some cases, while in other women extensive adhesions cause little or no annoyance. If the mobility of the uterus and its adnexa is limited, if repeated examinations produce the same pain by the same manipulations, we may presuppose either a parametritis or perimetritis. If we exclude a posterior parametritis because of its location, we are confronted with the diagnosis between paraoöphoritis and sclerosis of the ligamentum infundibulopelvicum on the one hand, and perisalpingitis and perioöphoritis on the other. With peritoneal lesions the tube and ovary are fixed.

Treatment of Pelveo-peritonitis.—In the acute stage of pelveo-peritonitis rest in bed is of course essential. The rubber ice-coil is applied to the abdomen or else an ice-bag separated from the skin by cloths. Cold sponging and the usual antipyretic mode of treatment should be instituted.

In peritonitis the abdominal viscera and the omentum are engorged with blood, so that other parts of the body are deprived of

it. The proper mode of treatment is to replenish the empty body vessels, according to J. Berry. The effusion of serous fluid in the peritoneal cavity soon loses its germicidal power. Draining this fluid through operation leads to the effusion of fresh serum and the consequent increased destruction of bacteria. In the treatment of peritonitis with no collection of fluid in the peritoneal cavity there is a small amount of poison in the peritoneal cavity. Treatment then consists of free purgation by salines and the administration of large quantities of fluid by the mouth, rectum, under the skin, or intravenously. A thorough cleansing of the intestines should be followed by very light diet, and the intestines should then be kept at rest.

The head of the bed should be elevated. In a more diffuse peritonitis with distention of the whole abdomen the patient should be kept quiet and the stomach empty until the inflammatory process and exudates have become localized. With increasing accumulation of exudate, this should be removed per vaginam and the pelvis should be packed with iodoform gauze, according to the recommendation of Pryor. In diffuse cases the sitting posture advocated by Murphy and the administration of salt solution by rectum every two hours are essential.

In the subacute stage cold cloths changed every four or five hours, or else a Priessnitz bandage, should be applied and the bowels should be moved regularly by enemata.

In the chronic stage warm and hot sitz-baths and warm full baths may be given. If exudative elements are present and temperature is absent, gentle but not too firm packing of the fornices with glycerin and gauze may be practised. In the presence of exudation, with fever absent, salt baths and the Nauheim baths are valuable. In old cases with the formation of adhesions a course of Nauheim baths associated with mechanical stretching of the adhesions is of great importance. Prolonged hot vaginal douches may be given as a preliminary to the bimanual stretching of peritoneal bands.

However, the very large majority of cases of perimetritis occurring otherwise than in connection with abortion or labor are gonorrheal in origin, and the therapy of this form is described under that section. The end-results of a perimetritis, whether originally subacute or acute, are adhesions. These adhesions

exist in connection with a pyosalpinx or a salpingitis or a salpingo-oöpohritis or tubo-ovarian cyst. The therapy, therefore, in these cases is surgical if pain persists. There is a large class of cases, however, in whom the adhesions about the tubes and ovaries or about the uterus are slight, stretchable, and often not made out on bimanual examination, but suspected because of the continuation of pelvic pain. A very few of these cases may be relieved of their annoyance by the use of hot vaginal douches, hot salt sitz-baths, Nauheim baths, and the vaginal therapy applied in the case of cervical catarrh. The application of a moist bandage at night sometimes affords relief. These slighter cases are frequently such as complain mainly of sterility, and they furnish the very largest proportion of the patients subjected to the so-called conservative operation on the adnexa.

UTERINE RETRODEVIATIONS; RETROVERSIO FLEXIO

In considering the supports of the uterus it is necessary to remember that it is embedded in, and surrounded by, a large amount of connective tissue. Originally no pelvic fascia exists, since every muscle fascia is simply connective tissue which has been developed by tension and exercise. The pelvis in the fetus is filled with a non-differentiated connective tissue, forming a common support for the pelvic contents, uniting and dividing the different organs and permitting mutual movement, as well as uniting the pelvic contents to their surroundings. The peritoneum covers all the organs and lines the depressions, covering especially the uterus, the tubes, and the vessels which run to the uterus. The ligaments are simply peritoneally covered connective-tissue bands, surrounding the important blood-vessels, and in them muscle fibers subsequently develop. The only ligament which is not formed passively is the ligamentum teres; it is preformed, while the others depend for their position upon the development of the uterus. While it is true that a lack of elasticity on the part of the uterine ligaments is a frequent cause of inhibition of uterine mobility, no one of them is an active factor in preserving the normal anteflexed position of the uterus. An important function of the parametria with their numerous muscle fibers is to preserve the cervix in an elevated position, and they are intended to give the uterus free play. Winter says: "The uterus may be pulled up to the symphysis, pushed into the sacrum, up to the lateral pelvic wall, or half-way up to the umbilicus; the portio may be pulled down to the vulva, and all this without pain." When the uterus is pushed up or pulled down, it returns to its normal place because of the elasticity of its surroundings. It belongs, therefore, to the most movable parts of the body, which fact speaks against an active influence on the part of the peritoneum or any one ligament in determining its position.

In the adult woman the uterus lies between the planes of the pelvic inlet and outlet. In the standing woman, with the bladder

empty, the uterus is in a horizontal position. The cervix is nearer the posterior than the anterior pelvic wall, and lies in a plane passing through both spinæ ischiadicæ. A perpendicular from the external os passes through the posterior portion of the perineum; from the internal os a perpendicular would pass through the middle of the perineum, while one from the anterior end of the corpus, which lies on a level with the fourth sacral vertebra, passes through the middle of the septum urethrovaginale (Waldeyer). It may be seen that, in this position, the cervix is much further back and but little lower than the fundus. The cervix enters into the upper end of the vagina at an angle with the latter, and the fixation of the vagina by the levator ani and the surrounding connective tissue, and the support furnished by the parametria, make the situation of the cervix a relatively fixed point. So long as the cervix is retained in this position and at this level, so long as the uterus, its "ligaments," and the levator ani preserve their natural elasticity, so long will the forces of pressure and tension within the abdominal cavity preserve the uterus in its normal anteflexed position.

Version implies that change of position of the uterus in which the cervix goes in one direction and the fundus in the opposite direction. A straight line of the uterus is preserved. If the fundus is further forward than is normal, the position is known as *anteversion*. If the fundus is further back, it is known as *retroversion*. In anteversion the uterus is straight, the cervix is high up, and points toward the sacrum. In *lateroversion* an old inflammatory process in the broad ligament connective tissue through retraction pulls the cervix toward itself and the fundus goes in the opposite direction, or else the retracted connective tissue pulls the fundus toward itself. In *retroversion* the fundus is situated posteriorly near the sacrum, the cervix is more anterior, and the canal of the uterus is straight.

Flexion implies a change of position of the fundus in relation to the cervix with the formation of an angle at their junction. *Anteflexion*, when pathologic, means that the angle at the internal os is sharper than normal. The cervix lies in the axis of the vagina and the fundus lies so closely on the cervix that the finger can scarcely enter the angle. *Retroflexion* finds the fundus in the hollow of the sacrum or in the cul-de-sac of Douglas. The cervix is nearer

the symphysis and the angle between the fundus and the cervix looks posteriorly.

Retroversion is a step toward the formation of a retroflexion which takes place as soon as the region of the internal os becomes soft. In retroversion the fundus is near the sacral promontory. Gradations between this form of retroversion and the most acute retroflexion are called *retroversio flexio*. The cervix is nearer the symphysis (Fig. 77) and the anterior wall of the vagina seems shortened. In pregnancy in a retroflexed uterus the cervix is pushed up right behind the symphysis. With retroversio flexio there is a dislocation of the tubes and ovaries to the floor of the pelvis or into the cul-de-sac of Douglas if the ligamenta infundibulopelvica are lengthened. The nearer the cervix approaches the symphysis, the more it inverts the bladder wall.

Retroflexion.—Under retroflexion (and retroversion) we must distinguish two forms—*the congenital and acquired.* Suffice it to say that in acquired retrodeviation the position of the uterus is due to such weakening of the parametria, especially the ligamenta lata, ligamenta infundibulopelvica, and the uterosacral ligaments, that the cervix descends and moves forward toward the symphysis (Fig. 77). Therefore the fundus moves backward, for in the standing position the uterus is no longer horizontal. There results, then, a retroversion or retroflexion. *Thus the primary descent of the uterus, or hysteroptosis, is the pathologic condition which causes the acquired retrodeviation.* This condition of hysteroptosis is an important factor in the causation of numerous symptoms. It is by no means necessary that hysteroptosis should be complicated by a retrodeviation if the round ligaments and ligamenta infundibulopelvica are short, but acquired retroflexions and retroversions are the result of hysteroptosis. This discussion concerns mobile conditions, for a retroversio flexio fixata involves a peritonitic affection, *i. e.*, a perimetritis.

Congenital Retrodeviations.—It is interesting to consider the etiology of congenital retrodeviations, and to note the frequency of their occurrence. No further proof is then necessary to establish the fact that retroversio flexio *per se* is not a severe pathologic condition.

In the embryo the Wolffian ducts take a course which follows the curve of the fetal body, and the ducts of Müller make their way

following closely the curved lines of the Wolffian ducts. The sexual strand, which includes the ducts of Wolff and the ducts of Müller, at an early stage shows an angle which represents the situation of the external os of the cervix. In the future development of the embryo the proximal end of the sexual strand, the subsequent uterus, takes on a position of anteversion. This position is aided by the descent of the ovaries and the remains of the Wolffian body, and by the pressure of the intestines gradually filling with meconium. This pressure can be appreciated from the fact that on the ovaries and tubes impressions of the intestines may be recognized. This anterior curve of the uterus becomes gradually more pronounced, so that in some cases the corpus uteri lies horizontally. This second resulting angle represents the position of the future internal os. In embryos in the second half of pregnancy the uterus is usually anteverted, with a somewhat anteflexed corpus. In the newly born the uterus rarely lies in the median line, but shows, as a rule, a deviation to one side or the other. It lies partly within the large pelvis, and the fundus projects above the inlet. It is therefore seen that anterior inclination of the uterus, with more or less anteflexion of the corpus, is the original position depending on certain processes of embryonal development (Nagel).

In the newly born fetus the intestinal tract and the urachus are thin tubes, while the genital tract fills out the remainder of the long, narrow pelvis, and the relatively large uterus lies mainly above the symphysis. The bladder is not yet unfolded, is long, and its fundus remains for a long time above the symphysis. With the gradual development of the bladder from its pyramidal to a round form, the pelvis also undergoes changes whereby it is no longer a straight continuation of the abdominal cavity, and its axis forms with the axis of the latter an angle which gradually becomes one of 90 degrees. The pelvis becomes wider, and the urethra is no longer a straight continuation of the bladder, but forms with the long axis of the latter a curve which is concave anteriorly. The uterus, which in the fetal period filled out almost the entire straight, narrow pelvis, is now only a small dependence on the posterior wall of the bladder, and, lying parallel to the main axis of the pelvis, the uterus takes on with the changed inclination of the latter, a still more anteverted position. The anterior inclination of the pelvis

becomes later still more pronounced, and is necessary for several reasons. One reason is that the bladder, when filled with fluid contents, would otherwise be carried as a burden by the elastic pelvic floor alone, and a full emptying of its contents would be impossible, for the lowest point of the pelvic floor in an upright position would lie lower than the external opening of the urethra. If, then, the pelvis did not take on a forward inclination, a condition like that in cystocele would result, for the bladder of the female lies deeper than that of the male (von Arx).

The ovary descends from its point of origin at the sides of the upper lumbar vertebræ, and lies in the newly born on the psoas and the vasa iliaca externa. Its final position in the fossa ovarica is gained during childhood. The ovary is connected with the tube and the ligamentum ovarii proprium, but does not make the complete descent which the testicle does, although conditions are favorable, as is proved by those cases where the ovary or tube is found in the canal of Nuck. In the ligamentum genito inguinale, later the ligamentum teres, is a muscle homologous to the cremaster. The ligamentum suspensorium ovarii is the former plica phrenicomesonephrica.

Although embryonal processes bring the uterus into the position known as anteversio flexio, errors of development may be the cause of malposition. The formation of a short vagina, with an embryonally long cervix and small fundus, displaces the cervix so that it lies close to the anterior pelvic wall, and the action of abdominal pressure may then change this retroversion into retroflexion. In the descent of the ovaries the presence of a short ligamentum ovaricopelvicum prevents the normal anteflexion of the uterus, so that, even if other factors produce no further change, a retroversion exists. Küstner finds a poorly developed corpus and a straight stretched retroverted uterus to be often present in a poorly developed fetus, while in a well-developed fetus a normal flexible anteflexed corpus is the general rule. Further, a fixation of the portio near the anterior pelvic wall, as a result of a poorly developed or short anterior vaginal wall, is productive of a malposition of the uterus. Such conditions have been found frequently enough in the fetus to explain the origin of congenital deviations, so that embryonal development is responsible, not alone for the

normal position of the uterus, but likewise for a large proportion of malpositions.

Symptoms Attributed to Retrodeviation.—When we consider the numerous operative methods used in correcting retrodeviations of the uterus, and the general adoption of the Alquiè-Adams operation for the correction especially of mobile retrodeviations, it would seem that retroflexio versio uteri was of itself a condition demanding operative treatment. The symptoms attributed to retrodeviations are pain, leukorrhea, menorrhagia, reflex nervous symptoms, and sterility. The pain takes the form of backache, pain in the sacral region, headache, and pain in the abdomen and thighs. The backache is supposedly caused by pressure of the uterus on the nerves, acting through the intervening structures, or by the "exudate and adhesions which often accompany the displacement, or by circulatory interference which causes congestion and obstruction to the venous flow." Pressure on the rectum is supposed to cause constipation and pain. Headache accompanies the backache, especially if there is constipation. Leukorrhea is said to be often the only symptom for which the patient seeks relief. In other instances the only symptom is sterility. Frequency of urination is supposed to be caused by the pulling exerted on the anterior vaginal wall, on the urethra, and on the vesico-uterine fold. Menorrhagia or metrorrhagia is said to be present in some cases. Dysmenorrhea is also mentioned as a symptom and painful coitus is said to be present in a smaller number of instances. In some cases, even where there are no local symptoms, there are said to be general symptoms in the form of indigestion, nervousness, skin affections, general pain, eye ache, etc. Epileptiform attacks are mentioned as symptoms in a smaller number of cases.

The annoyances so frequently found associated with these displacements, such as dysmenorrhea, sterility, metritis, endometritis, oöphoritis, bladder, rectal, and nervous symptoms, have been viewed from two entirely different standpoints. The belief, on the one hand, is that complications alone are the cause of the symptoms, and that the latter are not the result of the version or flexion. Proof is furnished by the fact that before puberty and after menopause deviations are found without annoying symptoms; by the further fact that the same symptoms are present with the above-

mentioned complications without uterine deviations; and by the important fact that treatment of the complications brings about a cure. The opposite view is supported by the statement that treatment of the deviation relieves the annoyances, that close examination shows the same symptoms to have existed before puberty and to continue after the menopause. The congestion of menstruation is considered, in the latter view, as being naturally an important element in increasing the annoyances during functional life.

The fact that some cases exhibit no symptoms is explained by the varying nervous stability of patients, and by the statement that structural changes do not occur in the pelvic tissues in all cases. The failure to cure the symptoms after the retrodisplacement is corrected is explained by the fact that permanent structural alterations have occurred in the uterus, ovaries, and circulatory apparatus. The fact that the correction and cure of the complications often give relief, even if the malposition is not corrected, is explained as occurring only in those cases where the complications are independent of the retrodisplacement or are the cause of it.

The uterus is stated to have a most intimate connection with the cerebrospinal nervous system and with the solar plexus or abdominal brain of Byron Robinson. Reflex impulses are supposedly sent out by a retroflexed uterus to the abdominal viscera and the spinal cord, with resulting alteration in the functional activity of the intra-abdominal organs and the nervous system.

The Dignity of Retrodeviations.—The objection which can be raised against the reports of those who attribute so many annoyances to retrodeviations, and who are in favor of operative treatment for that reason, is that they report large series of cases of retroversions and retroflexions without finding among them a large number of inflammatory and trophic alterations involving the uterus, tubes, and ovaries. It is impossible in a large series of cases not to have among them, in addition, a great number suffering from neurasthenia, from enteroptosis, from gastroptosis, and from pelvic, abdominal, and constitutional subinvolution. The backache so generally referred to the retrodeviation is usually due to hysteroptosis, gastroptosis, and most frequently to a posterior parametritis involving the uterosacral ligaments especially. Uterine leukorrhea is almost always an inflammatory condition due

to catarrh of the cervix and uterus. While it cannot be denied that, associated with retroflexion, there may be annoyances due, however, to congestion, yet entirely too much stress is laid upon the influence of a version and flexion. Structural alterations of the lining of the uterus, of the wall of the uterus, and of the tubes and ovaries not the result of the retroversio flexio are overlooked. The vast majority of cases with symptoms have lesions of these structures which are not always demonstrable by bimannual examination.

I hold the opinion that uncomplicated retrodeviations cause no annoyance, that nervous or "reflex" symptoms do not result from retrodeviations, but are caused by other conditions standing in no direct relation to the retroflexion. Theilhaber finds that after reposition the subjective symptoms may disappear in a few days, and yet examination shows the uterus to be retroflexed in spite of the pessary. This proves that the pessary by relieving the primary hysteroptosis relieves congestion, whether the uterus is retroflexed or anteflexed. In a large percentage of cases the patients feel no improvement as regards their nervous symptoms and their local disturbances, yet frequently examination shows the replaced uterus to be in perfect anteflexion. He finds no improvement as regards fluor, in spite of reposition of the uterus, and the bleedings are diminished decidedly in very few cases. I do not believe that version or flexion of the fundus causes a congestion in the uterine circulation. Dickinson says that deviation or malposition of the uterus does not affect the circulation of the uterus, as the circle of Robertson assures a perfect blood-supply. Further, the symptoms in many cases of decided retroflexion are almost *nil*, while in innumerable instances a mobile uterus, but little displaced, shows the so-called "typical symptoms" of retroflexion.

Frequency of Retroversio Flexio.—The examinations of Schroeder are of the greatest interest. To determine the frequency of retroversio flexio in healthy women, and in women not suffering from pelvic symptoms, he examined one hundred and eighty-four women six weeks post partum, eighty-two other patients complaining of no pelvic symptoms, and one hundred and forty-five general cases in the internal medical clinic in Königsberg. His examinations of four hundred and eleven patients included virgines intactæ, nulliparæ, and multiparæ. In

twenty-five virgines intactæ without pelvic symptoms, he found a retroversio flexio ten times. In forty-nine nulliparæ without pelvic symptoms he found fourteen cases of retroversio flexio. Three virgines intactæ with pelvic symptoms furnished one case of retroversio flexio, while five times retroversio flexio was found in thirteen nulliparæ suffering with some pelvic symptoms, giving for ninety nulliparæ thirty cases, *i. e.*, 33 per cent. of retroversio flexio.

One hundred and ninety-one multíparæ without pelvic symptoms furnished forty-two case of retroversio flexio, while twenty-nine retrodeviations were found in eighty-five patients acknowledging some pelvic symptoms, making a total of seventy-four cases of retroversio flexio in two hundred and seventy-six multiparæ, *i. e.*, 26 per cent.

At the menopause thirteen times retroversio flexio was found in thirty-eight patients without pelvic symptoms, while four cases were found in seven women with pelvic symptoms, giving seventeen retrodeviations in forty-five patients, *i. e.*, 27 per cent.

In these four hundred and eleven women were found 18 per cent. of retroversions and 10 per cent. of retroflexions, giving a total of 28 per cent. In three hundred and three patients without pelvic symptoms were seventy-nine retrodeviations, 26 per cent. In one hundred and eight cases with symptoms were thirty-nine retrodeviations, 36 per cent. It is to be mentioned that the symptoms were brought out only on special questioning.

It seems, therefore, that 25 per cent. of women in general have retrodeviations of the uterus, of which two-thirds have retroversions and one-third retroflexions. Of the seventy-nine cases of retrodeviation without pelvic symptoms, eight suffered from hysteria, three from neurasthenia, four from indefinite stomach symptoms, three from headache, and others from backache, dizziness, ischias, lumbago, etc. Of these seventy-nine cases only sixteen evidenced a more or less profuse menstruation, so that menorrhagia is not a result of retroflexion.

Of thirty-nine cases of retrodeviations with symptoms, six nulliparæ complained of some pain in the pelvis and back, with some disturbance (pain) during menstruation; five had aborted or had painful folds of Douglas; eleven had shortened, infiltrated, and painful parametria; three had descended ovaries, and five descent of the anterior vaginal wall, giving twenty-four cases suffering from

pain in the pelvis or back in whom causes other than the retrodeviation could be readily found.

This review is quite sufficient to establish the fact that congenital retrodeviations are very frequent, and that congenital retroversio flexio usually constitutes a practically negative condition so far as local symptoms are concerned. Congenital retrodeviation is very frequently a stigma of general, constitutional inelasticity.

How large a proportion of those retrodeviations, found on the first examination, during pregnancy or after pregnancy or abortion, are such congenital retrodeviations every one must decide for himself.

The dangers of retroflexion and retroversion are the possible occurrence of incarceration of the pregnant uterus in the hollow of the sacrum, and future descent and prolapse of the non-pregnant uterus. For this reason retroflexion should be corrected in all cases and retroversion when there is evidence of lack of elasticity of the pelvic ligaments and pelvic connective tissue. Besides, correction of acquired retrodeviation lifts up the cervix and overcomes the hysteroptosis which is the etiologic cause, and so tends to relieve congestion and the sense of pelvic weakness and looseness.

Relation to Pregnancy.—The course involved in pregnancy, however, is shown by the rare occurrence of retroflexio uteri gravidi incarcerata. Martin found in 24,000 gynecologic patients one hundred and twenty-one cases of retroflexio uteri gravidi, none of which caused decided annoyance. Of these, ninety-four came under observation with retroflexio uteri gravidi, while twenty-seven became gravid after they had been under observation. All these cases are probably pregnancies in a uterus already retroflexed. The majority of such cases are not noted because practically no symptoms are present. But incarceration may occur and therefore retroflexions should be corrected.

Relation of Retrodeviations to Prolapse of the Uterus.—In the opinion of Küstner prolapse of the uterus results from a retroversio flexio, while Veit holds that prolapse of the vaginal wall is an important factor in pulling the uterus out of its normal position. If the view of Küstner be strictly correct, the frequent occurrence of congenital retroversio flexio should be often followed and complicated by marked hysteroptosis, which, however, is not the case. When we consider how difficult it often is, in a vaginal hysterectomy, after opening the vesico-uterine plica, and after entering by incision

into the sac of Douglas, to bring down the uterus, we may understand how improbable it is that the descending vaginal wall alone can markedly affect the uterus, as Veit believes. Only when the parametria at the sides of the cervix and uterus are incised do we make a decided impression upon the uterus.

Retroversion and the bringing of the uterus into the axis of the vagina does give opportunity for descent and prolapse of the uterus through the action of intra-abdominal pressure against the uterus which constantly pushes it down through the axis of the vagina, but an involvement of the ligaments about the uterus and of the connective tissue in the pelvis and about the vagina, and the lack of the pelvic and general elasticity, are the important preliminary factors.

Acquired Retrodeviations a Stigma of General Inelasticity.—The changes and injuries resulting from pregnancy and labor have always furnished an important topic for the gynecologist. We hesitate now to refer many local or general symptoms to torn perineums or lacerated cervices. The movement has been higher up, and there too we no longer attribute to uncomplicated uterine versions and flexions the various physical and nervous annoyances supposedly caused through reflex channels. Numerous observations have taught us that retroversions and flexions are either congenital or acquired. We know that such displacements may exist with or without a pathologic involvement of tube, ovary, connective tissue, or peritoneum. Yet lesions of these latter structures are often overlooked, because a displacement, when found, is so generally accepted as a causative factor in producing almost any complaint.

On the other hand, daily instances come to notice of totally uncomplicated versions and flexions with symptoms, and of others without symptoms. Very many more instances may be noted of like annoyances without uterine flexion or version. We now understand the annoyances accompanying cases of hysteroptosis which are not complicated by version or flexion; for the condition of subinvolution of the ligaments is the important factor. In very many instances such a local condition is only an evidence of the existence of an abdominal and general subinvolution. Frequently, movable kidney, gastroptosis, enteroptosis, etc., are found coexisting. Such patients often evidence a flabbiness and lack of elasticity which is by no means the result of the pelvic condition, so that we

are compelled to consider the latter as a part of a general state. We are forced to the conclusion that non-inflammatory acquired displacements are the result of changes in the uterine ligaments, changes which include congestion and edema, and that such changes result first in a descent of the uterus, a hysteroptosis. The treatment of these associated lesions, and attention paid to the general condition of the patient, mark an important advance in the field of gynecology, and take us, in many instances, into the realms governed by the stomach specialist and the neurologist. We are getting over the error of following the principle of *cum hoc, ergo propter hoc.* If gynecology has involved numerous operative procedures for the correction of uterine displacements, it has also opened the eyes of the medical man to the fact that careful and complete restoration to the normal is an essential in post-partum treatment, and that such care covers rather a period of ten weeks than of ten days.

Hysteroptosis is associated with symptoms which may be understood when we consider the annoyances associated with gastro-enteroptosis, ren mobilis, etc. Above all, the predominant pathologic element is *congestion* and edema, not only of the uterus and adnexa, but especially of the connective tissue constituting the parametria.

Post-partum Treatment.—In post-partum treatment, therefore, great care should be taken to avoid hysteroptsis and a probably resulting retrodeviation. Küstner advises an upright position within a few days after labor, believing that in this way, and through the consequent exercise given to the uterine ligaments, the normal position of the uterus is assured. An all-important fact is this, that involution should include not only a return of the uterus, but a return of all the pelvic structures and the pelvic connective tissues, to a normal condition and normal position. This is especially important in cases in which forceps have been used.

The pessary as a preventive of permanent post-partum hysteroptosis is one of our most valuable adjuncts. The early and regular use of ergot is a most important factor if the patient cannot nurse her baby. The wearing of abdominal belts and binders is a most salutary aid. Above all, abdominal massage, exercises, and hydrotherapy should have a permanent place in this field, for nothing else so relieves congestion, increases elasticity, and aids invo-

lution. An additional important benefit is the restoration to the patient of a normal general circulation by a course of Nauheim baths. (See Subinvolution.)

The Meaning of Retroversio Flexio.—Many retrodeviations are of congenital origin. Retroversio flexio *per se* is not a pathologic condition responsible for marked local or general symptoms. The symptoms generally associated with retroflexion are not typical, are present in innumerable cases without displacement, and are due to uterine, tubal, and ovarian complications. Where retroversio flexio without peritoneal, tubal, or ovarian complications is associated with symptoms, the primary hysteroptosis and abdominal and constitutional subinvolution must be taken in consideration, always bearing in mind the influence of such physical states as gastroptosis and ren mobilis. Prolapsus vaginæ and cystocele, while often associated with retrodeviations, are independent affections. Where retroversio flexio is accompanied by local symptoms, these, if not due to myometrial, peritoneal, tubal, or ovarian complications, may be corrected in the vast majority of cases without surgical treatment, for pelvic congestion is the important alteration. If the use of the pessary causes a cessation of symptoms, a surgical operation which keeps the uterus in normal elevated position permits of removal of this support.

"Reflex" or constitutional symptoms are not due to retroversio flexio.

Diagnosis.—The diagnosis of the position of the uterus is made by bimanual examination, supplemented perhaps by the use of the sound. The two fingers of the examining hand are introduced into the vagina and so turned that the palmar surfaces look upward in the anterior fornix. The other hand presses upon the abdomen in the median line between the umbilicus and the symphysis. The external fingers gradually exert gentle deep pressure through the abdominal wall, moving gently down toward the symphysis. The internal examining fingers press upward, and if the uterus is in normal anteflexion and if the bladder is empty, the fundus will be felt by the internal fingers or between the external and the internal fingers (Fig. 5).

If the uterus is anteverted or only slightly anteflexed, the internal examining fingers should be placed in the posterior fornix and the

cervix should be lifted up toward the abdominal wall. The fundus is thus brought near the abdominal wall, and by the same external manipulation as before described the fundus will be felt by the external hand, and pressure on it will be communicated to the fingers situated underneath the cervix in the posterior fornix (Fig. 8).

If the uterus is retroflexed, the internal fingers should be introduced into the vagina, into the posterior fornix, the thumb should be situated over the clitoris, the two last fingers should be folded on the palm of the hand and pressed against the perineum. The weight of the body leaning against the elbow of the examining hand exerts pressure which pushes the internal fingers toward the hollow of the sacrum (Fig. 4). A retroflexed uterus will be then made out in the cul-de-sac of Douglas or higher up, and the cervix can be followed in continuity over the posterior angle into the fundus (Fig. 6). Pressure by the external hand on the abdominal wall between the umbilicus and the symphysis increases the intra-abdominal pressure and brings the fundus closer to the internal fingers.

If the uterus is retroverted, the same manipulation should be used in passing the index and middle fingers high up into the posterior fornix. The external hand begins deep pressure at the promontory of the sacrum. In many cases then the internal fingers can pass along the cervix in a straight line up to the fundus of the uterus. In other cases the external fingers can feel the fundus underneath the promontory of the sacrum. In many cases in nulliparæ and in patients with tense or fat abdominal walls neither the external nor the internal fingers can feel the fundus. If the fundus is sought for in its normal anteflexed position and not felt (Fig. 7), and if it is not found retroflexed, the uterus may be safely considered to be midway between these two positions, namely, in retroversion.

Not alone for the purpose of placing the uterus in its normal position, but also as an aid in determining its position, as well as for the purpose of determining its mobility, the two following steps should be carried out in every bimanual examination: (1) Without the aid of the external hand the internal fingers should be passed deeply into the posterior fornix and underneath the cervix, and the cervix should be lifted up toward the abdominal wall (Fig. 78). This puts the uterosacral ligaments and the posterior parame-

trium on the stretch. If then the middle finger be passed from right to left in the posterior fornix, thickened uterosacral ligaments can be made out and any peritoneal adhesions on the posterior wall of the uterus can be felt (Fig. 79). At the same time the mobility of the uterus is defined and pain will be produced in the back and in the rectum in pathologic involvements of the posterior parametrium and greater pain with peritoneal adhesions. (2) After performing this manipulation the index-finger should be placed in the anterior fornix and the middle finger high up in the posterior fornix (Fig. 80). The index-finger then pushes the cervix down and backward, which manipulation, when repeated several times with increasing firmness, always preceded by the lifting of the cervix, will bring a movable fundus further forward toward the symphysis (Fig. 81), especially if with retroflexion the middle finger at the same time pushes up on the fundus. If then the external hand be pressed deeply down toward the hollow of the sacrum behind the point to which the fundus is brought by this manipulation, and if then these fingers pull or massage the fundus toward the symphysis, almost every case of movable retroversion and retroflexion can be brought temporarily into normal anteversion or anteflexion (Fig. 82). If the external fingers be passed behind the uterus and the uterus cannot be brought forward or can be brought forward only with pain, we may presuppose the existence of peritoneal adhesions to the uterus or fixation of the tubes and ovaries with shortening of the ligamenta infundibulopelvica, or else we feel the retracted uterosacral ligaments. In such instances the middle finger of the internal hand being passed high up into the posterior fornix can make out the peritoneal adhesions, and if passed into the lateral fornices can make out the lateral or deep fixation of the tubes and ovaries.

In doubtful cases, if there is absolute certainty that pregnancy does not exist, the sound aids, by the direction taken up by the tip of the sound, in determining the position of the fundus. The sound is not of great importance in determining the position of the uterus in uncomplicated cases, but is of great aid in the differential diagnosis, especially if a mass in the posterior fornix is thought to be a fibroid or a parametritic exudate or a pelvic hematocele or pelvic exudate.

Treatment.—Since the danger of retroversio flexio consists in the frequent occurrence in multiparæ of further descent and prolapse of

the uterus, the uterus should be restored and kept in place in its normal position. In many cases the annoyances are not enough to justify operation or the patient refuses operation. Then the pessary should be used for months and years (Figs. 83, 84, 85, 86). The percentage of permanent cures by pessaries is small. Permanent results are obtained by the various forms of operation devised for retroversio flexio. In a certain number of cases, especially such as are known not to have been congenital, and which have developed after labor and which are seen before involution has taken place in some ligaments while others are in a state of subinvolution, in such cases the use of the pessary often brings about a permanent cure. In general the use of the pessary should be avoided when there are inflammation or adhesions about the uterus. There are some cases, however, in which, in spite of old adhesions of the adnexa, reposition of the uterus and the use of the pessary cause no discomfort. In such cases, which are rare, the use of the pessary is sometimes advisable. (See pages 95, 96.)

Retroversion.—Pessary treatment of retroversion is advisable to avoid the occurrence of retroflexion or of further descent of the uterus. In some cases it seems as if retroversion may contribute to the production of bladder symptoms. In mobile retroversion the patient should sleep on one side or on the other and as much as possible on the abdomen, and should avoid overdistention of the bladder.

The treatment of *fixed retroversion* is the treatment of perimetritis. The softening and loosening of adhesions is the important point. Intravaginal pressure-therapy by glycerin and gauze packing is of value, especially if the adhesions on the posterior uterine wall extend to a fixed point, that is, the pelvic wall. Prolonged warm and hot vaginal irrigations are used to soften the adhesions and to make the manipulation involved in bimanual attempts at stretching of the adhesions and correction of the retroversion less painful. The subjective annoyances are diminished by a course of Nauheim baths, which improve, in addition, the metro-endometritis. After a course of baths, stretching of the adhesions is much easier and this manipulation may be carried out during a course of the baths. If replacement is eventually possible, without pain and annoyance, a Hodge, Smith, or Thomas pessary

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may be inserted, provided, of course, there is no marked or purulent involvement of the adnexa.

Retroflexion.—Uncomplicated mobile retroflexion causes few or no general symptoms. When constipation, pain on defecation, dyspepsia, pain in the abdomen and back, and nervous symptoms are present, there is a natural inclination to decide that the position of the uterus must be corrected by operation. If, however, patients are not benefited by local conservative treatment by preliminary correction with the pessary, it is hard to understand how operation will correct the local and "nervous annoyances" of an uncomplicated retroflexion. The general state, with which a pelvic ptosis or retrodeviation is associated, is one of constitutional inelasticity, splanchnic neurasthenia, or physical or mental asthenia. In some cases, it is true, general treatment fails to cure the patient entirely of her symptoms. It is probable that slight nervous annoyances are sometimes relieved by operation; for the rest, change of surroundings and the mental effect associated with an operative procedure have a therapeutic value. In innumerable cases of retroflexion there are unrecognized involvements of the tubes, broad ligaments, ovaries, and peritoneum. There is no doubt that in some patients the value of the pessary is due to or enhanced by the element of suggestion, *i. e.*, by psychic influence.

The uterus may be fixed by simple adhesions of its body or may be fixed through adhesions of the adnexa. Adherent retroflexion is ofttimes benefited by conservative treatment. The adhesions may be loosened and stretched by bimanual manipulation if no acute or subacute inflammations are still present about the uterus. If the bands are adherent to the pelvic wall, intravaginal pressure-therapy by glycerin and gauze packing may be used. Prolonged hot vaginal douches of 112° F. and over prepare the tissues for bimanual treatment. Sclerotic bands are softened by this method, by hot sitz-baths, or by a course of Nauheim baths, and in this manner a retroflexion may be corrected after such treatment when usual ambulatory methods do not avail. If eventually the uterus can be brought into normal position, it may in some cases be treated like a movable retroflexion and held in normal anteflexion by the use of the pessary.

Contact adhesion is to be treated by intravaginal pressure-therapy before using a pessary.

SUBINVOLUTION

Uterine Subinvolution.—In pregnancy the uterus undergoes great hypertrophy, hyperplasia, and dilatation, associated with which is a stretching, a growth, and hyperemia of the broad and other ligaments, and of the various pelvic structures. In addition, there is hyperemia and congestion of the intra-abdominal organs. The intra-abdominal organs and the abdominal wall are subjected to pressure and stretching by the enlarged uterus. The vascular system is put to greater strain and a general state of hyperemia and altered metabolism results. During pregnancy we have an increased amount of watery elements of the blood, an increased proportion of fibrin, a diminished amount of albumin, an increase in the white blood-cells, a relative diminution in the number of red blood-cells and in the amount of hemoglobin. Before labor the temperature is higher in the last three months of pregnancy and there is an increase in the elements of the body, equal to one-thirteenth of the body-weight. This increase is due to serous infiltration and to the increased ability of the body to form organized tissue. Post partum, after a temporarily short rise, the temperature is lower, the blood-pressure sinks and becomes normal on the sixth day. After labor there is a diminution of tissue change and a diminution in the amount of urine.

The return to normal size, position, and condition (1) of the pelvic structures, (2) of the abdominal organs and of the abdominal wall, (3) of the general circulatory apparatus and of the nervous system, constitutes involution. This a process which, for its completion, involves from three to six months, and which often never occurs. The failure of involution (subinvolution) may be due to frequent successive pregnancies. It may result after one labor.

Simple Subinvolution.—During uterine involution fatty degeneration and atrophy of the muscle fibers occur, so that the muscle

fiber may regain its normal dimensions. Failure of uterine involution is often due to congestion in the uterus or in the surrounding tissues. Displacement of the uterus is an important factor. Retained placental structures or retained decidua are contributory elements. An important element is a poor general circulation. Uterine subinvolution is most frequent in women who do not nurse. Within a few weeks after labor the uterus is large, soft, and atonic. The patient has a sensation of weight in the pelvis; there may be profuse serous discharge, there may be menorrhagia, there is backache, and atony of all the pelvic structures. If such a condition is allowed to persist, permanent changes take place. The same holds true of incomplete abortion.

Subinvolution Fibrosis.—Under the peritoneal covering of the uterus is a membrane of elastic fibers. In addition, between this layer and the mucosa there are three other layers of elastic fibers. The elastic and fibrous tissues situated between the muscle bundles send branches between and around every muscle cell at right angles to the long axis of the cell, furnishing a framework or elastic support which protects the fibers from overstretching and which permits their return to normal position on contraction. In pregnancy the elastic fibers undergo hyperplasia. The same changes take place in the parauterine and periuterine elastic fibers. When involution fails to occur and subinvolution persists for a long time, then, in addition to subinvolution of the muscle fibers, there occurs a marked increase in the elastic and fibrous connective tissue. There finally results an end-stage, which furnishes an enlarged, hard, brittle uterus, associated with which is an inelasticity of the blood-vessels and often an arteriosclerosis of the blood-vessels. In such a fibrosis there is a hyperplasia of the connective tissue, the elastic elements are thickened, and there is an increased amount of fibrous connective tissue. In the connective tissue around the uterus, in the broad ligaments, in the connective tissue between the bladder and the uterus, there are large dilated veins. In the broad ligaments there are plexuses of varicose veins.

The tendency to the occurrence of fibrosis is increased by numerous labors occurring in rapid succession, by retroflexion occurring after labor, by inability to nurse, and by the performance of physical

labor. As a result of the subinvolution and of the frequent pregnancies such uteri are hard, enlarged, and firm. They grate on cutting. Such uteri have poorly conditioned muscle fibers, and are composed of much fibrous connective tissue and of numerous elastic fibers poor in contractile power. This uterine alteration is a very frequent cause of menorrhagia and also of metrorrhagia, and causes very frequently, toward the age of the normal climacterium, such a lack of contractile power in the uterus, with or without arteriosclerosis of the vessels, that extremely profuse bleedings occur, for which, often enough, only a hysterectomy can be of any aid, for even curettage and atmocausis often fail to stop the bleedings.

Inflammatory Metritis.—In contradistinction to such a simple subinvolution fibrosis, the uterus may be thickened, hypertrophied, sclerotic, or enlarged as a result of chronic inflammatory changes in the uterine lining and uterine wall. We are then dealing with an inflammatory end-stage of a real inflammatory metritis. As a rule, the distinction is not made between such alterations due to inflammation and similar changes due to failure of involution on the part of a uterus The latter is generally considered under the heading of metritis. If the term metritis is to be used for inflammatory cases, then the end-stage of subinvolution should be called non-inflammatory metritis or fibrosis uteri. (See Metritis.)

Pelvic Subinvolution.—Subinvolution of the uterus itself is often only of secondary importance. Of far greater significance are the condition, size, and elasticity of the ligaments about the uterus. These ligaments, filled with elastic connective tissue and muscle fibers, are responsible in a very great measure for retaining the uterus in its normal position. The elastic fibers and the connective tissue about the vagina, bladder, etc., are of great importance in retaining these two organs in their normal situation. There occurs very frequently after one or more labors a failure in these ligaments to return to their normal elastic condition. They remain elongated, inelastic, flabby, resulting in *descent of the uterus*, with or without retroversion and retroflexion, descent of the posterior wall of the vagina, descent of the vagina, etc. Of great importance in this connection is the condition of the levator ani muscles and of the muscles in the perineum. Much has been said of the effect of

perineal laceration on the production of cystocele and descent of the uterus. It is a fact that even deep median laceration of the perineum which does not tear the insertion of the levator ani fibers is not productive *per se* of descent of the vagina. That with lateral laceration of the levator ani such conditions do occur, can be readily understood, when we consider the insertion of the levator ani fibers to the rami of the pubis, their close anatomic relation to the lateral walls of the lower part of the vagina, and their insertion about the rectum, anus, and coccyx. Subinvolution or laceration of these muscles, which form so important a part of the pelvic floor, is productive of a loosening from their situation of the bladder and vagina. But these alterations of position on the part of the bladder and vagina are as much due to atrophy or subinvolution of the connective tissues as to the injuries to the muscle fibers.

Constitutional Subinvolution.—The condition which we finally observe constitutes a ptosis of the genital structures, to which the name of hysteroptosis may well be given. The name *hysteroptosis* is of special significance, for in the majority of these cases there is also a ptosis of other abdominal structures. It is natural to expect that the abdominal wall which does not return to a normal condition of elasticity, in which the recti are abnormally overstretched, in which the fasciæ of the abdominal wall are overstretched, will fail to give proper intra-abdominal pressure and in this way fail to aid in sustaining the intra-abdominal organs in their normal position. But this is not the only important factor. The same failure on the part of the supports of the intestines and stomach to return to their normal state of elasticity, the inelasticity or atrophy of the connective tissues, fibrosis of the elastic fibers in these structures, and the disappearance of fat about the kidneys, are important elements which cause enteroptosis, gastro-enteroptosis, and movable kidney. Probably half of the cases of gastro-enteroptosis have a retroverted or a retroflexed uterus. With or without relaxation of the abdominal wall, with or without displacements of the intra-abdominal organs, there exists, too, for weeks, months, and often for years, a condition of intra-abdominal congestion in which the important blood-channels of the intra-abdominal cavity are loaded with stagnated blood, with conse-

quent failure of proper blood-supply of these important secretory organs, and so resulting in altered functions of the stomach and intestine in particular. Associated therewith is a heavy dragging sensation, indefinite pains in the stomach and abdominal cavity, backache, feeling of weakness, indigestion, constipation, and malnutrition.

This condition, while a local one, is markedly dependent on the lack of tone in the general circulatory apparatus. This is a state which occurs not only in women who have been pregnant, but is also a general condition, often to be referred back to rickets in childhood, to the effect of various infectious diseases, to the influence of chlorosis and anemia.

Albu has examined a great number of youthful individuals and children with reference to the occurrence of visceroptosis. In fact, irrespective of the causes usually named in the possible etiology of this condition, he concludes that in a large majority of cases visceroptosis is a congenital anomaly, which is latent so far as the symptoms are concerned, until contributory factors increase the abnormalities of sensasion and of function caused by the existence of ptosis. Visceroptosis accompanies a certain form of the body characterized by excessive development in the long axis with imperfect development of the framework in the direction of breadth and depth. The whole figure inclines to be angular, and among the bony irregularities accompanying this type of body we find a narrow flat thorax with stenosis of the upper thorax aperture and a freely floating tenth rib. The superficial coverings of the body show diminished panniculus adiposus and a flaccid weak musculature, especially evident in the abdomen. The frequency of this congenital anomaly has been increased in the modern age by various abnormal conditions of life leading to ill-nutrition and to exhaustion of individuals, whose children are then much more apt to show congenital deformities. The prophylaxis of visceroptosis lies in the improvement of general hygienic and social conditions.

A condition of this sort is very frequently acquired by women who have been pregnant, and it is, of course, especially aggravated in those patients in whom the etiologic factors just mentioned have been present and in whom there is a tendency to splanchnoptosis

before marriage. There is an improper circulation of blood throughout the entire system. There is a failure of proper nutrition of the various organs of the body. There is improper oxidation of tissue. There is a sensation of general languor and lassitude, a lack of energy and tone. Combined with this lack of general circulatory tone is a parallel condition in the nervous system. There is physical and mental asthenia; in other words, neurasthenia is the predominant condition. These patients suffer from palpitation of the heart, are weak and tired, suffer from indigestion and constipation, sleep is disturbed or irregular, there is restlessness. Patients cry easily and often show a lack of mental poise and stability. This condition may well be described as one of *constitutional subinvolution.*

Splanchnic Neurasthenia.—"There are a large number of gastric and intestinal affections with bizarre and protean symptoms designated as gastric and intestinal neuroses, but which in reality owe their genesis to the congestion of the intra-abdominal veins." "The greater the intra-abdominal tension, the less blood will be contained in the intra-abdominal veins." "This tension is largely dependent on the tone or tension of the abdominal muscles. Therefore, nervous exhaustion is a frequent cause of diminished tone of the abdominal muscles, which in turn diminishes intra-abdominal tension and conduces to blood stagnation in the veins of the abdomen." "Venous congestion interferes with a proper supply of arterial blood. The tissues and the organs bathed in pools of stagnant blood are practically in a state of asphyxia. The toxic products of digestion, which are normally removed by an unimpeded circulation, have a specifically poisonous effect on the sympathetic system, a fact which is evident, owing to the frequent occurrence of depression, prostration, and nervous symptoms in nearly all disorders of the alimentary canal." "Gastro-intestinal disturbances, of whatever nature, seriously compromise the integrity of the nervous system, either by inducing neurasthenia or aggravating it, if it exists."

"The entire question of splanchnic neurasthenia is one of abdominal plethora dependent on a variety of causes—notably diminished intra-abdominal tension, insufficient lung development, a

defective vascular apparatus. Splanchnic neurasthenia is one of the few forms of neurasthenia amenable to permanent cure, by measures having for their object relief of abdominal venous congestion." "In any splanchnic neurasthenia existing as an independent affection, the relief of symptoms almost positively follows relief of the venous abdominal congestion" (Abrams).

There is certainly in many women a predisposition to the occurrence of abdominal or constitutional subinvolution. It is noted in women in whom there is a general inelasticity, an almost complete absence of fat, and a tendency to neurasthenia. Such women frequently have little energy. Even the greatest subsequent care fails to restore the various organs of the body to normal tone. This general state often occurs without the presence of an enlarged uterus. In fact, prolonged nursing is a frequent cause.

Lactation Atrophy.—The changes occurring in lactation atrophy are a concentric atrophy of the uterus with a cavity of normal size but with a deficiency of muscular elements. These latter cases are frequently associated with small adnexa. The majority of nursing women who have a uterus under the normal size show all the evidences of poor nutrition, and especially laxity and flabbiness of the general body structures. In "prematurely aged women" lactation is poorly borne. It is in these cases that Frommell finds the greatest amount of uterine atrophy, and he supposes it to be an evidence that nursing deprives the body of a large amount of nutrition.

Thorne considers lactation atrophy to be a reflex trophoneurosis, and believes that every nursing amenorrheic woman has a hyperinvoluted uterus, without, however, an involvement of the ovaries. He acknowledges the frequency of anemic conditions associated therewith, but observes that those cases menstruating during nursing show no atrophy of the uterus. This associated menstruation is an evidence of sufficient ovarian stimulation.

This condition of *abdominal and constitutional subinvolution* explains in many cases the relation so long and even still held to exist through reflex channels between cervical lacerations, cervical erosions, cervical catarrh, uterine catarrh, and especially uterine

retroversions and flexions, on the one hand, and certain nervous phenomena on the other. In many instances the nervous condition is due to alterations in the ovary produced by tubo-ovarian, ovarian, and peritoneal complications, which complications are generally the result of an upward extension of a cervico-uterine infection. These ovarian lesions may be simply that mild infection of the follicles which leads to the formation of so-callled "cystic ovaries." The ovarian changes may be sclerotic in their character, resulting from mild tubal and peritoneal infecting lesions and from a mild paraoöphoritis or parasalpingitis. The inflammatory changes in the ovary may be a chronic form, producing alterations not always easily classified, but interfering with the secretory work of these glands and causing ovarian dysmenorrhea. Aside from inflammation, congestion and improper circulation may interfere with the proper function of the ovaries. Hence pelvic and abdominal subinvolution may cause such functional ovarian changes as are symptomless so far as pain, or marked pain, is concerned. Even changes in the menstrual regularity or in the menstrual amount may be slight or absent; changes from the normal are often present. The important end-effect is an interference with the proper secretory function of the ovaries.

Hyperthyroidism.—We are often concerned with the care of patients who have grown nervous since child-birth. Of course, among such instances are nervous conditions due to various other causes and tendencies. A certain proportion of such nervous patients are, however, undoubtedly suffering from what is known as hyperthyroidism. Cases of hyperthyroidism may occur without local thyroid changes upon which we can place the tangible responsibility. These are due to a faulty relation between the ovarian secretion, on the one hand, and the thyroid secretion, on the other. An altered or diminished ovarian secretion results in a relative increase of secretion from the thyroid. The consequent symptoms vary from nervousness and irritability up to symptoms which include sleeplessness, palpitation, rapid pulse, causeless diarrhea, flushes, etc., but without any exophthalmos, goiter, or marked tachycardia, or else with exophthalmos of varying degrees, or goiter more or less marked, or both. It is important to recognize

the fact that Basedow's disease frequently occurs in an aberrant form, and that the cases shade down gradually to forms which, since exophthalmos, goiter, and marked tachycardia are absent, are to be called hyperthyroidism. Many such patients are found to have cystic ovaries, sclerotic ovaries, or other pathologic non-recognizable ovarian changes. Thus relative hyperthyroidism produces a group of symptoms like the nervous symptoms of the typical menopause or climacterium, except for the fact that flushes or flashes are less marked or absent.

Post-partum Treatment and Prophylaxis.—A weighty element in the causation of these conditions of subinvolution and hyperthyroidism is failure of proper care in the post-partum stage. In the post-partum stage frequent examination of the patient should be made and the uterus and its ligaments should be restored to the normal. Abdominal massage should take care of the abdominal walls, deep abdominal massage should take care of the colon and intestines (Figs. 93, 94, 95, 96, 97). Tonics should take care of the blood-corpuscles and stimulate the circulatory apparatus, and Nauheim baths should restore the circulation and the nervous system to its proper balance.

Within a few hours after labor the patient should be encouraged to spend very little time on her back, lying mostly on the right or left side. After the flow of milk has been established and the uterus is in the true pelvis, the patient should spend an hour every morning and an hour every afternoon lying flat on her stomach, and should sleep in this position a part of each night. A tight abdominal binder is not to be used, a comfortable binder being all that is necessary. Attention should be paid to avoiding distention of the intestines by gas. At all times the bladder should be emptied at intervals of six hours. From the fifth day on, patients should use a commode at the bedside. Patients should be allowed to sit up on the fifth or sixth day for a short time, increasing the period daily so that the patient can be out of bed on the eighth to the tenth day, provided there has been no temperature reaction, even though slight. Toward the end of the second week or in the beginning of the third week, a course of baths should be begun containing at first salt, then salt and calcium chlorid, and finally carbonic acid

gas should be added. (See Nauheim Baths.) Internal examination should then determine the position of the uterus. If there is any appreciable retroversion or retroflexion, or a noticeable

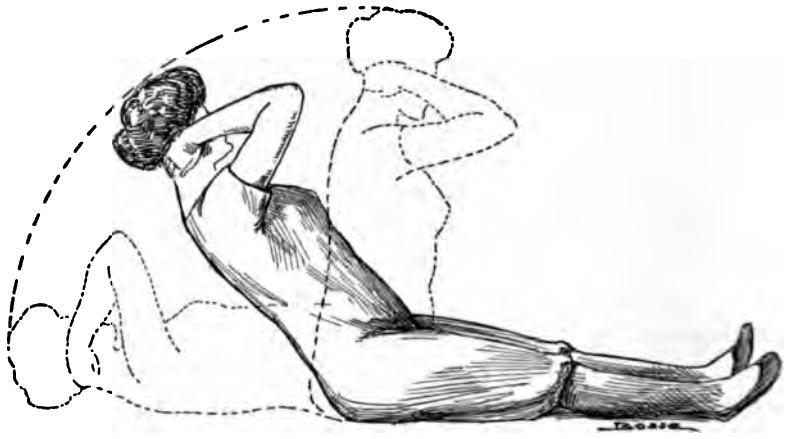

Fig. 133.—The best auto-exercise for getting the recti and abdominal muscles into good condition. The patient, with body held rigid and chest thrown out, raises herself slowly from lying to seated position and slowly then returns to the flat position. This is repeated for from ten to fifteen times morning and night, beginning on the twelfth to fifteenth day and continued for several weeks.

tendency to descent of the uterus, a pessary should be introduced or else the vagina should be packed three times a week with gauze and glycerin, to give the uterus and the connective tissue elevating support. The return of the uterus to its normal size should be aided by the use of ergotol, 15 minims, three to five times daily, if a flow of milk has not been established. Lifting should be avoided. If the abdominal walls fail to promptly return to a tonic state, superficial and deep abdominal massage should be given and an abdominal belt should be applied and worn and exercises should be carried out (Figs. 93–98 inclusive, 133, 134).

The two best exercises are pictured in Figs. 133 and 134.

Treatment should be devoted rather to the prevention of these conditions than to their cure, for if once the uterus undergoes a fibrotic change, if the ligaments of the pelvis and in the abdomen are not early restored to normal tone, treatment is then concerned with giving support by mechanical means to the uterus, to the

abdominal walls, and to the intra-abdominal organs. When care of the general circulation is begun early and done systematically shortly post partum, its application is extremely efficacious in

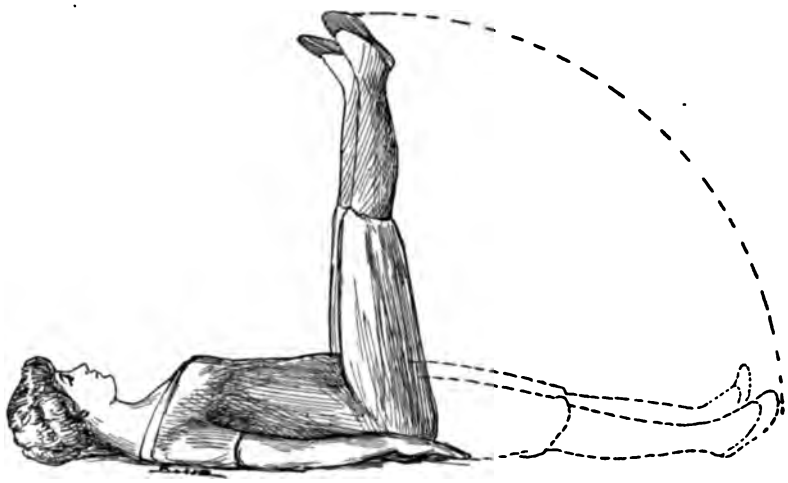

Fig. 134.—The patient lies on her back, holds her legs together and straight, and then slowly lifts them, without bending the knees, to the perpendicular position, and then slowly lets them down to the flat position. This is repeated for from four to ten times morning and night after the exercise shown in Fig. 133 has been continued for a week, when it is continued in conjunction with exercise shown in Fig. 133.

avoiding either constitutional subinvolution or hyperthyroidism. The longer this condition exists before treatment, the more difficult it is to correct, for the patients lose their courage, acquire fixed ideas and phobias, and since the resulting condition came on after labor, are finally of the opinion that a genital condition is at fault, and feel certain that only an operation will be of any value. It is just in this class of cases that operations done for the correction of displacements of the uterus, for the correction of cystocele and perineal lacerations, for the fixation of movable kidneys, etc., fail of their purpose, because such operations fail to cure the basic general asthenic condition of the patient.

In the treatment of those cases coming to us with pelvic, abdominal, and constitutional subinvolution already established, attention must be paid to the pelvic congestion, to the bleedings, to

the character of the uterine ligaments, to the abdominal wall and to the organs within the abdomen, to the general circulation, and to the condition of the nervous system.

It has been shown that 30 per cent. or more of women who come for a general physical examination evidence a right kidney so movable that the entire organ can be palpated. This condition is so common and so seldom gives rise to symptoms that it cannot be regarded as pathologic. In spite of this fact, however, many of the cases are improperly subjected to an operation to fix the kidney and cure the patient of a great train of vague symptoms which have been attributed to these slightly movable kidneys. Results have shown that these symptoms persist after operation. Most frequently operations are done to fix one or both kidneys if movability was but one of the evidences of visceroptosis. The operation of nephropexy is of distinct value in only a slight number of cases. These are cases of extreme mobility *with definite symptoms*, such as Dietl's crises, due to temporary obstruction of the ureter, or marked pain and distress, which can be distinctly traced to the misplacement of the kidney. The operation of kidney fixation is now rarely done (Bevan).

So far as the uterus is concerned, we must make use of the glycerin treatment with gauze, or of gauze packed into the fornices and followed later by the pessary, supplemented by the use of short hot vaginal douches. As regards the abdominal walls and ptosis of the intra-abdominal organs, we make use of abdominal massage, of diet for the correction of obstipation, of exercise directed to the strengthening of the abdominal walls, of an abdominal belt or Rose's bandage, and of hydrotherapy, most easily administered in the form of the Nauheim baths (pages 109, 114, 135, 445, 453, 488). So far as the use of drugs is concerned, those given for their effect on the nervous system and for their effect on the quality of the blood are indicated. For the former purpose a combination of bromid of strontium and sodium glycerophosphate is the best (p. 429). For the latter purpose a combination of iron, arsenic, and ovarin is of the greatest value, often combined with cascara (pp. 221–420).

These cases are often associated with bleedings. They demand the use of douches, electricity, and sitz-baths for the production of uterine and pelvic anemia, and the drugs mentioned in the section on

Uterine Bleedings. (See also Section on Myometrial Degeneration, etc., p. 686.) In giving the Nauheim baths, care is to be taken to avoid in these cases even a temporary exaggeration of the bleedings. Restoration of a normal circulation is followed by benefit, and most assuredly do the ovaries and the nervous system share in this nutritional alteration.

Abrams finds the sinusoidal current (p. 459) of great value in the treatment of "*splanchnic neurasthenia.*"

MALPOSITION OF THE UTERUS AND VAGINA

An altered *position* of the uterus implies a change in location of the entire, normally curved uterus with regard to its normal anatomic relations to the cavity of the pelvis. The entire uterus may be nearer the symphysis, or may be situated further back than normally and nearer the hollow of the sacrum (*retrodisplacement*). It may be descended or it may be prolapsed.

Anteposition of the uterus is produced by a retrouterine tumor of the tube or ovary, by hematocele in the cul-de-sac of Douglas, or by a peritoneal exudate situated in the cul-de-sac of Douglas.

Retroposition or retrodisplacement of the uterus means that the whole uterus is nearer the posterior pelvic wall, that the fundus is in the hollow of the sacrum under the sacral promontory, and that the normal anteflexion of the uterus is retained. The uterus may be pulled back into this position by adhesions in the cul-de-sac of Douglas resulting from hematocele or from a pelvic peritonitis, but occurs most frequently through the sclerosis and retraction of the uterosacral ligaments and the posterior paramentrium produced by a posterior parametritis. The important symptom is severe backache.

A lateroposition of the uterus means that the uterus is pulled or pushed toward the right or toward the left pelvic wall. This is produced by tumors of the adnexa, especially by intraligamentous tumors. A recent intraligamentous hematoma or a parametritis with exudation will push the uterus toward the other side, whereas an old sclerosing parametritis may pull the cervix or the fundus toward its own side.

Hysteroptosis.—A certain degree of ptosis of the uterus precedes the production of an acquired retroversion or retroflexion. Ptosis of the uterus with descensus vaginæ means that the anterior wall of the vagina or the posterior wall of the vagina or both walls are descended in association with a marked descent of the uterus. If the uterus is descended down to the vulva, such a hysteroptosis is called a *descensus*, and implies a preliminary retrodeviation.

If the uterus extends beyond the vulva, the condition is called a *prolapse*.

Primary descensus and prolapsus uteri are due to inelasticity and stretching of the ligaments connected with the uterus and to inelasticity of the pelvic connective tissue.

In the *primary form* the upper part of the vagina preserves its roof or fornix anteriorly, posteriorly, and laterally and the cervix is not elongated. In the *secondary descensus* associated with elongation of the cervix there is inelasticity of the uterine ligaments, and especially inelasticity of the connective tissue about the vagina. The vaginal walls descend, pull on the uterus, pull it down, and elongate the cervix. The uterus when measured by the sound is increased in length, the rounded roof of the fornix is absent, and the upper part of the vagina is angular and hugs the cervix closely.

Küstner believes that the uterus cannot leave the pelvis or the vagina if situated in physiologic anteflexion. He considers that it must first come into a position in which its axis has almost the same direction as that of the vagina. A retroversion or slight retroflexion then permits abdominal pressure to cause a descensus of varying degrees. The nearer the portio approaches the vulva, the more is the vaginal canal shortened, and so finally lies outside the vulva as a prolapsus vaginæ, a condition so often combined with a retroversio flexio. He thus considers prolapse of the uterus and vagina to result after the retroversio flexio.

Prolapsus Vaginæ.—Any pronounced descent of the uterus is accompanied by a descent of the vault of the vagina. It must be noted that in addition to this descent of the vault of the vagina, even though slight, the lower end of the vagina often protrudes with a descensus uteri.

Although the presence of a retroflexio versio may make it easier for a prolapse of the vagina to occur, yet Veit considers prolapse of the vagina an independent affection, and considers the vaginal wall to be the factor which pulls the uterus out of its normal position. Against this latter view of the cause of descensus uteri in many cases it may be said that anatomic considerations and surgical experience prove that the parametrium, *when normal*, is of such a character that a prolapse of the vagina is, of itself, incapable of pulling down or displacing the uterus.

Descensus uteri and prolapse of the vagina, though often combined, are two independent affections. The fact that the two are

often coexistent is no proof that one is always associated with the other. Either may occur independently. They are due to the same cause, *i. e.*, injury during labor, and subinvolution. Atrophy or degeneration of certain tissues about the vagina may cause the mucous membrane to lie in folds, as is so frequently the case at the climacterium, when there is a resorption of fat and a change in the connective tissue, a disappearance of active elastic fibers, and a loosening of the various relations. Such changes not infrequently occur, too, in younger women. In addition, there is a frequent congenital malformation, whereby the lower end of the vagina, the hymen, and the external genitalia, extend beyond the rami of the pubis, constituting a congenital elongation of the vagina. This form, mild in nulliparæ, is often greatly increased in multiparæ, and constitutes a true prolapsus vaginæ. Such a condition of the lower half of the posterior vaginal wall, due to perineal laceration, is not a rectocele unless it contains a diverticulum of the rectum.

TREATMENT

A certain degree of hysteroptosis is responsible for the acquired forms of retrodeviation. The cervix has descended downward and forward in the pelvis, has approached the symphysis, and the fundus falls backward, since the uterus is no longer horizontal when the woman stands up. The pessary corrects a retroflexion or retroversion because it holds the cervix high up and far back toward the sacrum, hence the fundus readily stays forward.

There are many cases of hysteroptosis without retroversion or, especially, retroflexion. In spite of descent of the cervix the fundus is held forward by the round ligaments, the broad ligaments, or by its own rigidity at the internal os. There is ptosis, but no version or flexion toward the sacrum. One hundred women with an uncomplicated hysteroptosis of this type will furnish just as many cases of backache, hypersecretion, and "reflex symptoms" as will one hundred cases of uncomplicated retrodeviations. The retrodeviation of the fundus *per se* is of no moment in the production of symptoms. Hence some of these cases of hysteroptosis are greatly benefited by treatment which lifts up the uterus, which diminishes uterine and pelvic congestion, and which involutes the ligaments.

Intravaginal pressure-therapy and the pessary are important. General treatment is essential. (See Subinvolution.)

In the more severe degrees of hysteroptosis with which a retrodeviation is always associated, a pessary may lift up the uterus and hold it in place provided the vaginal walls are not too relaxed and if the levator ani muscles preserve some of their elasticity. In some cases round rubber or wooden rings or the Menge pessary (Fig. 88) serve to support the uterus and relieve the dragging sensation. Rest in bed and thorough packing of the vagina with gauze and glycerin will have a beneficial effect on some cases and will restore them to a state where pessaries will be of aid.

Otherwise the ideal operation for the correction of descensus uteri and prolapsus uteri in women who are to bear no more children is vagino-fixation as practised by the author, an especially valuable operation because it permanently corrects the associated cystocele or prevents its occurrence if not present with hysteroptosis.

Retrodisplacement is a frequent malposition of the uterus. Occasionally it is a congenital condition, and if it causes annoyance it should be put into normal position by a pessary after preliminary treatment by intravaginal pressure-therapy to first lengthen the congenitally short uterosacral ligaments. In these cases the vagina is a very long one.

Acquired retrodisplacement is the result of a sclerosing posterior parametritis, and among other pains, felt during or between menstruation, is the constant backache and discomfort on defecation. The anteflexed uterus lies in the hollow of the sacrum. These cases can be much benefited by repeated packings with glycerin and gauze packed thoroughly into the posterior fornix and left in place for twenty-four hours. Prolonged hot vaginal douches are taken daily and a twenty-minute hot sitz-bath is taken at night. These soften and make succulent the sclerosed connective tissue and the uterosacral ligaments. Later on, vagino-abdominal massage is done gently and steadily for two to five minutes twice a week, followed by the introduction of glycerin and gauze (Figs. 91, 92). In the course of a few weeks the uterus is made so freely movable that a pessary can be introduced and the uterus is held in normal position. Such cases are frequent and furnish a class of patients whose symptoms can be markedly relieved. This acquired condition is the result of an old, very long-continued cervical catarrh. With this condition a large hypertrophied cervix is often present.

VAGINAL HERNIAS

While they do not constitute affections which markedly affect the comfort of the patient, vaginal hernias, especially the two common forms (*cystocele and rectocele*), are often complicated by annoying symptoms, conditions, and states. The origin, prophylaxis, and importance of vaginal herinas are not subjects of general agreement. Dependent as they are on the injuries and lesions consequent on labor, and evidencing their presence, as a rule, long after the same, various views as to the origin of anterior vaginal hernias have been based on the presence of uterine displacements and perineal lacerations, while theories of an uncertain character have served to settle the etiology of rectocele.

The connection between perineal lacerations and rectocele, for instance, is generally discussed without due attention to the important muscular lesions which produce these affections. Therefore, the frequency with which decided perineal lacerations are not followed by rectocele must have been noted by all close observers. For a long period the value of the perineum and the relation of its injuries to the condition known as cystocele have also been erroneously estimated. Most striking, from a clinical aspect, is the disproportion between the evident affection and the symptoms in numerous cases. External injuries afford no criterion as to the state of the deeper tissues of the pelvis or as to the annoyances the patient feels or may feel later on. The so frequent correction of these external hernias without the attention to pelvic lesions, the correction of uterine malposition without preliminary or subsequent treatment of the other pelvic states, which may not be characterized by digitally evident lesions, are therefore not always attended with results satisfactory to the patient.

Just as hysteroptosis and prolapsus vaginæ should be considered affections independent of each other, although their etiology is the same, so prolapsus vaginæ and the various forms of vaginal hernia should be differently viewed. The name *cystocele* is generally applied to any protrusion of the mucous membrane of the anterior vaginal wall extending through the ex-

ternal opening of the vagina, and which is either externally visible or which actually extends beyond the external genitalia. Such a condition, however, may be a congenital elongation of the vagina, a prolapsus vaginæ, or a true cystocele. A close distinction is often not made and the two latter terms are sometimes applied indiscriminately.

Anatomic Relations of the Vagina and Bladder.—Prolapsus vaginæ and cystocele must be distinguished, for a cystocele constitutes simply a hernia of the bladder, as may be seen from a study of the anatomic conditions. Cystocele, too, is independent in its origin of uterine displacements. I am reminded of an old case of decided cystocele, in a woman fifty-five years old, which had pulled down the anterior fornix, so that this area, too, was a part of the cystocele covering. Tugging had elongated the anterior lip of the cervix at least one inch, and yet the uterus was in normal position and not descended. On the upper portion of the cystocele wall intestines could be felt, for the bladder connections with the cervix were entirely loosened. No rectocele was present and no descent of the posterior or lateral vaginal walls.

We may have: (1) Cystocele with a normally situated uterus; (2) cystocele with a hysteroptosis; (3) cystocele with a retrodeviated uterus; (4) cystocele with a hysteroptosis plus a retrodeviation of the uterus. In addition, we may have cystocele with or without rectocele.

The diaphragm of the pelvis is formed of the levatores ani and the musculus coccygeus, and is perforated by the rectum, the vagina, and the urethra. The rectum is the only one of these three canals really united to the levator ani.

A muscular connection for the urethra and the vagina begins only when they pass through the trigonum urogenitale.

The vagina at its outlet is surrounded by the musculus bulbocavernosus, which is attached posteriorly to the centrum perineale, and which anteriorly surrounds the corpus clitoridis. It is called the constrictor cunni. The pars anterior of the musculus trigoni urogenitalis is situated at the sides of the vagina, its fibers crossing anteriorly in front of the urethra, forming the compressor urethræ. The pars media of the muscle consists of circular fibers, arranged about the vagina and the urethra. Higher up the fibers do not unite behind the vagina, but do unite about the urethra alone.

The vagina penetrates the diaphragm of the pelvis in the middle of its own length. On its upper surface is the vesicovaginal septum of connective tissue and its close connection with the urethra, the urethovaginal septum. Laterally it is bounded by a vessel plexus and connective tissue and by the levatores ani. Only at its lower end has it the above-mentioned intimate relations with muscle fibers. The important relations of the vagina are with the trigonum urogenitale and its muscle, the perineum, the septum urethrovaginale, and especially with the levatores ani.

The urethra in its lower two-thirds is firmly connected with the vagina. Laterally, on either side passes the levator ani. Lateral to it and surrounding it are the musculus trigoni urogenitalis and the musculus bulbocavernosus. Anterior to the urethra are the plexus venosus pudendalis and the trigonum urogenitale.

The bladder in the newly born is a tube narrowed above into the urachus, which, with the umbilical arteries, holds the bladder close to the anterior abdominal wall. In adults, after descent of the bladder, spaces are formed which are filled with fat. Before puberty the fundus of the bladder rests upon the cervix and the upper third of the vagina. In adults only the trigonum vesicæ rests on the vagina and probably upon the portio. Because of the absence of the prostate, the orificium internum urethræ lies deeper than in the male. Below the bladder are the symphysis, a body of fat, the pudendal plexus, and the urethra. Below and lateral to the bladder are connective tissues of the parametrium and the muscles of the pelvic floor, especially the levatores ani. In front of the bladder is found the fascia vesicæ, and the cavum Retzii filled with fat, in front of which is the transversalis fascia covering the posterior surface of the symphysis.

The bladder is held in place by the peritoneum, the fascia vesicæ, the ligamenta umbilicalia, the musculi pubovesicales, and the liagmenta pubovesicalia. It is supported by the vesicovaginal septum of connective tissue, connective tissue, fat, and the levator ani muscles. From a study of these relations (Waldeyer) it may be seen that the vagina, except at its outer end, is simply surrounded by connective tissue. The only thing which prevents the vagina from being pushed down by abdominal pressure is the action of the levator ani muscles and the character of its connection with the surrounding connective tissues. Atrophy or degeneration of these

tissues causes the mucous membrane of the vagina to lie in folds, as is so frequently the case at the climacterium, and in younger women, too, when there is a resorption of fat, a change of connective tissue, a disappearance of active elastic fibers, and a loosening of the various relations. Such a condition affects the lateral wall of the vagina, primarily, to only a slight extent. It is only affected secondarily after prolapse of the anterior wall.

After pregnancy and labor there is a disturbance in the anatomic condition of the various structures of the pelvis. The levatores ani and constrictor cunni are decidedly stretched and often torn, and, as a result, the narrow vagina is widened and the original narrow slit becomes a large canal. There is a disappearance of fat and a flabbiness and edema of the connective tissues and of the ligaments—that is, subinvolution is observed. Such a condition in the anterior wall, almost always a sequence of labor, permits the filled bladder, loosened from its fastenings, to descend and produce a protrusion of the weakened anterior vaginal wall through the injured levator ani and the connective-tissue floor, which, normally, support it in place. The lesions are exactly the same as occur in hernia in the linea alba of the abdominal wall.

Cystocele.—This tendency to flabbiness of the connective tissues is a frequent result of labor, and occurs most frequently in individuals who exhibit this tendency as nulliparæ. Gastroptosis, gastroenteroptosis, and ren mobilis have been found to occur frequently in rachitic and neurasthenic individuals. I have referred to such cases evidencing even as nulliparæ a decided tendency to a descent of the uterus and to flabbiness of the pelvic structures, and have referred to the frequency of their combination with abdominal ptoses. To this descent of the uterus, of whatever grade, because of its etiology, I have given, in harmony with the conditions existing in the abdomen, the name hysteroptosis. These patients especially, as well as others, show after labor every evidence of subinvolution, even if the uterus returns to its normal size. The ligaments of the pelvis and of the abdomen are loose, edematous, and flabby, and the muscles of the pelvic floor evidence the same characteristics. Most important, there has been an injury to the levator ani muscles and the musculus trigoni urogenitalis (especially in instrumental delivery) or else these muscles are subinvoluted. Naturally enough, as a result of the descent of the uterus, retroflexio versio is frequently

present, and for this reason main attention has been paid to the displacement, and it has been considered the etiologic factor in causing the subsequent changes, while the elements of local subinvolution and atrophy and predisposition to inelasticity and injury to the levatores ani have been overlooked.

With such cases, as well as with any other case of subinvolution of the pelvic structures, if there has been a stretching of the levator ani or a rupture of the same, a space is immediately formed which furnishes opportunity for descent of the bladder through pressure upon the weak anterior vaginal wall. The edematous swelling of the urethral prominence and its protrusion into the vagina are the first evidences. Added to this, the same conditions of edema or atrophy exist in all the connective-tissue elements uniting the bladder with the symphysis and abdominal wall, with consequent loss of their support. The erect position, abdominal pressure in emptying the bladder and in defecation, plus the abdominal condition, result eventually in a descent and hernia of the bladder. Perineal laceration with the supposed resulting absence of support of the anterior vaginal wall by the posterior wall has nothing to do with this resulting hernia.

In catheterizing these cases of true cystocele it is perfectly evident that the bladder fills out the dilatation in the anterior wall, and the bladder is no longer supported by the levatores ani of the two sides, which, normally, are close together along the urethra and the lower portion of the vaginal wall. In cystoscoping these cases it is readily seen that the bladder constitutes a hernia. It is not the descent of the vaginal wall which brings the bladder with it, but the weight of the filled bladder which dilates and stretches the subinvoluted anterior vaginal wall. I have, in numerous instances, found the uterus absolutely normal in situation and pulled down into the vagina only with difficulty, and yet the cystocele was pronounced.

Proof of the fact that the weight of the filled bladder is the cause, is shown by the frequent recurrence of a cystocele after anterior colporrhaphy, even though, in addition, a high perineum is restored by plastic operation with a resulting narrow vaginal canal.

Enterocele; Rectocele.—Out of the broad general class, prolapsus vaginæ, we must remove the following forms of vaginal hernia: (1) The most frequent, involving the lower half of the anterior vaginal wall, the so-called prolapsus vaginæ anterior, or, better and

truly speaking in most cases, *cystocele*. (2) Prolapse of the upper third of the anterior vaginal wall through descent of the intestines (rare). It is possible only when the union between uterus and bladder has been disturbed. This condition constitutes an *enterocele vaginæ anterioris*. (3) Prolapse of the upper portion of the posterior vaginal wall through a descent of the intestines, or *enterocele vaginæ posterioris*. Here the uterus and the lower half of the vagina may not be affected as regards their position. The upper part of the posterior vaginal wall, however, is pushed down by the intestines in the sac of Douglas. (4) A dilatation of the lower half of the posterior vaginal wall containing a diverticulum of the rectum—a true *rectocele*.

The various forms are usually combined. The lateral walls are rarely affected. In those conditions in which the uterus is normally elevated, in conjunction with these affections there may be an elongatio colli, extending even to the vulva. Such primary elongation of the cervix is rare. It results usually through tugging on the part of the bladder and vaginal wall. The cervix is then very thin and atrophic; this is due either to atrophy after inflammation or to atrophy due to the above tugging, and occurs only if the uterus was firmly fixed.

In line with the fact that the etiology of acquired retroversio flexio is pelvic subinvolution, it is found that the most frequently noted form is cystocele with retrodeviation of the uterus. Next in frequency is cystocele, plus rectocele. The latter is due to laceration of the perineum and to injury to the perineal and rectal insertion of the levator ani. Least frequent, supposedly, is cystocele alone. My experience, however, shows the last form, existing alone, to be much more frequent than generally stated. A prolapse of the uterus with invagination of the vagina occurs most frequently after the climacterium, as a result of senile atrophy of the pelvic tissues.

Treatment.—For mild degrees of cystocele Skene's pessary (Fig. 87) may be tried. Sometimes a small Hodge or Smith pessary will be of aid. Occasionally a ring or Menge pessary is effective in supporting the uterus and lifting up the cystocele. Operative relief is the wisest. Even with shortening or fixation of the round ligaments or with ventral fixation a cystocele frequently recurs after anterior colporrhaphy. Two factors may be stated

as certain: (1) The correction of a retroflexion by these methods, though advisable, is not essential in the correction of a cystocele; (2) treatment of the posterior wall of the vagina is not the essential factor in correcting the lesion in the anterior wall. Theilhaber treated surgically twenty-four patients, almost all of whom showed an elongatio colli. The anterior colporrhaphy consisted in making the excision extend far, laterally, into healthy tissue. He resected the anterior vaginal wall up to the lateral wall, paying little or no attention to the posterior vaginal wall or to the perineum. Out of the twenty-four patients thus treated, twenty-two remained without recurrence; the other cases could not be traced. There were no recurrences, in spite of the fact that fifteen cases had retroflexed uteri which were not treated surgically.

The good results obtained by Theilhaber were due: (1) to so changing the character of the anterior vaginal wall that the upper ends of the levator ani muscles were brought close together; (2) to narrowing the anterior wall of the vagina; and (3) to removing the thin urethrovaginal septum, and so closing the space on the under surface of the bladder, through which this organ formerly descended.

Another valuable method, and one which is of considerable importance, in the vaginosuspension or vaginofixation of the uterus according to the method of Dührssen. Although the value of the latter in the case of women past the child-bearing period is generally acknowledged, this favorable opinion as to the use of the former in younger women with cystocele who are to bear more children is not general. Without going into the question further, suffice it to say that the experience of my teacher, Dührssen, since the perfection of his method, and my own experience in over one hundred selected cases, leave no room for criticism of this method of supporting the bladder. It is remarkable how slight are the vesical annoyances associated with cystocele. The patients simply feel a protrusion on standing or on straining and usually say "the womb is coming down." With rectocele, and its associated injury to the levator ani muscles, constipation and inability to force out the feces felt in the rectum are the most noticeable complaints. There is a sensation of pelvic looseness. Senile vaginitis makes these conditions annoying. In the operative correction of rectocele it is essential to unite the torn rectal ends of the levator ani muscles.

PREGNANCY AND ABORTION

Early Diagnosis of Pregnancy.—In the third or fourth months of pregnancy the introitus vaginæ is so typically dark blue that this condition is pathognomonic, but in the very early weeks there is only a slight bluish discoloration of the vaginal wall, especially on the urethral prominence. This is usually most distinct in multiparæ. In the early weeks of pregnancy the vagina and cervix become succulent and there is increased secretion. The cervix, as expected, shows the earliest bluish discoloration in early pregnancy, for this tinge of blue is frequently present just before menstruation also. The portio becomes softer, especially at its lower end. The most important sign is enlargement of the uterus, which becomes broader and thicker.

The uterus in the first three months grows faster than does the ovum because it grows in part independently of the ovum. At the fourth month, when the cavity of the uterus is obliterated by the union of decidua reflexa with decidua vera, the growth of the ovum causes growth of the uterus. The uterus grows continually softer, so that in the fourth month it is sometimes so soft that the fundus is not readily made out, and the error is frequently made of mistaking the portio for the uterus. The fundus when made out may be mistaken for a cystic tumor. This error is due to the fact that the line of division between the firm cervix and the extremely soft fundus is so soft that a connection between these two parts of the uterus does not seem to exist. In the earlier months also this area of softening is marked in the lower uterine segment, even if the cervix and fundus feel firm. If the internal examining fingers are placed in the anterior fornix, and if the external hand is passed over the posterior wall of the uterus until the tips of the fingers reach the region of the internal os, the tips of the external and internal fingers come into contact as if no uterine tissue were present. This means that the soft edematous anterior and posterior walls of the lower uterine segment are neither of the firmness of the cervix nor of the cystic or firm character of the fundus. This condition, made out by bimanual examination, is

one of the earliest sure signs of uterine pregnancy, and is called the sign of Hegar (Fig. 135).

In the early weeks of pregnancy in uniparæ or multiparæ a differential diagnosis must be made from chronic metritis and from fibrosis uteri. In these states the uterus is enlarged and may occasionally be soft. The cervix may be soft in conjunction with fungoid hyperplasia of the endometrium, so that the differential diagnosis from pregnancy in the first two months is often difficult. There is, however, no blueness of the introitus or of the vagina and

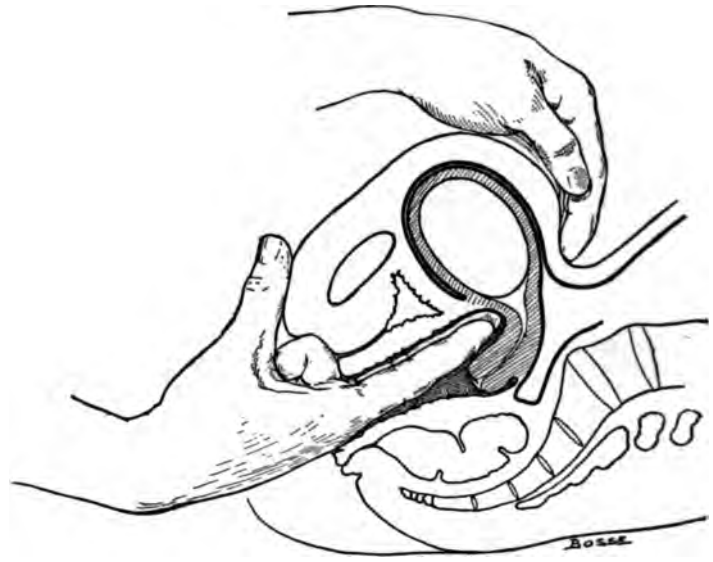

Fig. 135.—The method of determining that softness of the cervix at the region of the internal os known as Hegar's sign. It often seems to the examining fingers as if the cervix and the soft fundus were not connected at all.

there is no sign of Hegar. There is no history of amenorrhea except in nursing women, and in them the uterus is small. A definite diagnosis can be made by noting the growth of the uterus after an interval of two or four weeks. Asymmetry of the two cornua is an important sign, the uterus changing in size and outline during examination.

Embedding of the Ovum.—A fecundated ovum shows upon its outer surface a development of cells known as trophoblast cells. It is from these trophoblast cells that the covering of the future

chorionic villi and the placenta are formed. The characteristic of the trophoblast cells is that by enzyme action they burrow their way into the decidua, digest the tissues in their periphery, perforate the blood-vessels, and thus receive their nutrition from the maternal circulation. These cells form the two-layered covering of the villi, the syncytium and the cells of Langhans. The uterine lining develops into decidua by a great hypertrophy of the connective-tissue cells, accompanied by dilatation of the vessels and congestion of the whole uterus. So delicate is the relation between the growing ovum and its trophoblast cells on the one hand, and the decidua and the maternal blood on the other, that the wonder

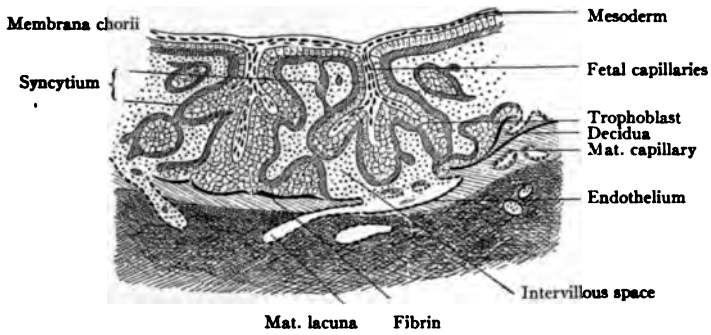

Fig. 136.—Diagrammatic representation of the formation of the villi; their structure of trophoblast cells, their covering of syncytium, and their delicate connection with the decidua, as well as the growth of trophoblast cells into the decidua (after Peters).

is not that abortion takes place, but that it does not take place more frequently (Fig. 136).

Changes in Ovum.—Abnormalities in the ovum itself may be the cause of abortion. These abnormalities consist first in a syphilitic change. It may be taken for granted, even though this cannot be verified in the early cast-off ovum, that an ovum made syphilitic by the fecundating spermatozoön produces an abnormal character of cells, and the viability of the little embryo is readily involved. If then, at a very early stage, there is death of the embryo, or if the cells from which the chorionic villi and the future placenta are formed are not healthy ones, it can be seen that the relation between ovum and decidua may be readily disturbed. The ovum is then a foreign body, uterine contractions take place,

and abortion results. If in the early course of pregnancy, through any form of maldevelopment or through any form of involvement of the cord the embryo dies, abortion results. Any disease of the mother which results in an exchange of toxic products may injure the ovum, cause the death of the embryo, and force its expulsion.

Changes in Maternal Tissues.—The greater number of abortions, however, result from involvements of the maternal tissues. Here syphilis of the mother may be an influence, in that the processes of placental development are carried on in abnormal decidual tissues. There may be, in addition, a failure of proper nutrition of the ovum. Diseases associated with high temperature may destroy the embryo. If the mother is suffering from an infectious or other disease which produces toxins that poison the embryo or which alter the character of the endometrium, we are concerned then with a cause of abortion. Endometritis implies an involvement of the uterine lining, inflammatory or non-inflammatory. It can be readily seen that an inflammatory involvement resulting in great congestion of the uterine mucosa, or resulting in atrophy of the uterine mucosa, with or without a change in the vessels, destroys the delicate balance between ovum and decidua or fails to give opportunity for sufficient nutrition of the fetal cells. Overgrown uterine mucosa in the form of hyperplasia, accompanied as it is with tendency to hemorrhage at menstruation and associated with dilated capillaries and vessels, causes ready capillary hemorrhage. The growth of the trophoblast cells and the extension of the chorionic villi is supposed in every case to perforate capillaries; but if these capillaries are sclerotic or diseased ones, or if congestion is marked, too much blood is forced out and the ovum is loosened from its contact with the decidua serotina or perforates the *decidua reflexa*. This is perhaps the most frequent cause of abortion, especially of repeated abortions. An ovum which settles in the lower segment of the uterus and which develops there will result eventually in the production of a placenta prævia. It is quite probable that many cases of abortion, especially in the early weeks, are instances of ova situated in the lower segment of the uterus, the part which is not intended for early stretching and growth, and for that reason uterine contractions take place to an unusual degree and the ovum is thrown out. It is probable that placenta prævia indicates the

existence of an abnormal endometrium, an endometrium which does not permit of the location of the ovum near the fundus, and for that reason results in its descent to the region of the internal os.

Changes in the Uterine Wall.—Changes in the uterine wall may be responsible for abortion. A uterus which is inflamed by metritic processes, which is hypertrophied as the result of subinvolution, accompanied as it is by congestion and arteriosclerosis, is either stimulated to undue contractions in the course of pregnancy or else is liable to bleeding from brittle arteries. Every uterus, whether pregnant or not, undergoes normal painless contractions, which is nature's method of keeping the uterine muscle in good condition. These painless contractions continue, and in the later months of pregnancy are known as the Braxton-Hicks painless contractions. An inflamed or sensitive uterus reacts by unusual contraction to the presence of the growing ovum, and if of sufficiently marked character, the result is hemorrhage and mechanical loosening of the ovum. We must consider hypoplasia of the uterus too a cause of abortion, especially in first pregnancies. The uterus is then somewhat small, the decidua does not develop a sufficiently rich character, the uterine wall is thin, the necessary hypertrophy and hyperplasia of the uterine wall do not occur, the uterus does not grow sufficiently, and abortion in the early months may take place.

There are abnormalities in the ovum which may result in abortion, either through their action on the uterine wall or because they result in the death of the embryo. We refer here particularly to the change known as hydatid mole. It is more than probable that many cases of abortion, especially those in which the ovum is thrown out as a whole, are microscopic early forms of hydatid mole, which only microscopic examination can verify.

There are other conditions within the uterus of a rather unusual nature which are likewise the cause of abortion. A septate uterus is such a cause. An ovum here develops in only one-half of the uterus, its growth is limited by the septum, changes in blood-supply result, and abortion may take place.

Uterine polyps, and particularly unrecognized submucous fibroids, are productive of abortion. They produce bleeding or hemorrhage in the uterine mucosa or mechanically prevent the growth

of the ovum and bring about uterine contractions which expel the growing ovum.

Displacement of the Uterus.—Displacements of the uterus, especially retroflexion, are considered to be a cause of abortion through the abnormal congestion which they produce and the consequent tendency to minute or greater bleeding. While this is true in some cases, yet pregnancy to full term in retroflexions is an almost every-day occurrence, while in other cases the correction of the displacement by pessary or operation fails to prevent subsequent abortion. Isolated single abortions are so frequent and occur for so many different reasons that the non-recurrence of this condition after the correction of retrodeviations should not be considered too great a proof of the importance generally attached to uterine displacements, as endometritis and metritis and fibrosis may be the important factors. Of course, a retroflexion should be corrected to prevent an incarceration of the uterus when pregnant, in the true pelvis, and to avoid the future risk of prolapse of the uterus. Physical injury and physical shock, etc., may produce abortion by mechanical action if they result in unusual hemorrhage from the vessels about the ovum or produce a mechanical separation of some of the chorionic villi. Blood accumulates between the ovum and the uterine wall and the ovum is cast off. Abortion produced by drugs or intrauterine manipulation is not considered here.

Symptoms.—The symptoms of abortion are bleeding, pain caused by uterine contractions and by dilatation of the cervix, and local evidences of an attempt at expulsion of the uterine contents. The bleeding is either the primary or the secondary factor. It is primary if a hemorrhage takes place which acts as a mechanical factor in separating the ovum. It is secondary if the ovum dies or is partly separated, and, being then a foreign body, the uterus contracts in its attempts to expel it. Uterine contractions continue to separate the ovum, more bleeding takes place between ovum and decidua serotina, and blood is poured out of the cervix. The pain associated with abortion is due to uterine contractions and to cervical dilatation, and for exactly the same reasons as at full term. The uterus contracts close down upon the egg, blood accumulates in the uterus, the uterus contracts to expel

the blood, and this process continues until the broken or unruptured ovum is entirely loosened from contact with the uterine wall. It is not alone the uterine contractions, but also the dilatation of the cervix which produce the pain. The degree of dilatation of the cervix, then, is one of the means of determining whether abortion is progressing or not. Given a uterus which is bleeding, in which pain is slight, in which the cervix is not dilated, and we are here concerned with a case in which the bleeding and the progress of the abortion may under proper treatment cease. If, however, bleeding continues, it threatens the life of the ovum. If the blood is poured out rapidly and accumulates in the uterus in the form of clots, it stimulates the uterus to further contractions. If the ovum is partially separated from the uterine wall, or if the embryo is dead, the uterus naturally reacts by further contractions. Therefore the continuation of uterine pain and the increasing dilatation of the cervix are indices of an inevitable abortion.

In the bleedings which occur during pregnancy, involvement of the vagina, portio, and cervix can be excluded by examination. Regular bleeding may come from a double uterus. Bleeding from a pregnant uterus may occur as the result of an existing fungoid endometrium. There may be a long-continued oozing, especially of brownish blood mixed with mucus. There are recurring pains, but not of marked severity and not accompanied by the loss of much blood or by dilatation of the cervix. The bleeding comes from the lining of the uterus, from the decidua vera. An endometritis deciduæ (inflammatory) is a frequent cause of habitual early abortion. *Ectopic gestation must always be considered and differentiated.*

An inevitable abortion is associated with the loss of much blood and of fresh blood, whereas irregular bleeding or the loss of brownish blood mixed with mucus does not indicate immediate danger. When, in addition to the loss of fresh blood, pains come on, this combination has a more direct meaning. If at the same time the uterus becomes more tense or becomes harder, it indicates that abortion is in progress. If, then, the cervix is open and the internal os admits one finger, we are concerned with dilatation of the cervix, which is a most important sign of inevitable abortion.

Hegar's sign is important in early cases seen for the first time in whom pregnancy has not been previously diagnosed, especially

so if there is a history of long-continued irregular menstrual periods and for the purpose of excluding *ectopic gestation*. An important aid is the introduction of the finger into the uterus when the cervix is open. In beginning abortion the finger feels the round ovum more or less cystic. In incomplete abortion the finger feels retained sac or decidua or retained placenta, which are recognized by the fact that they can be peeled off with the fingers. Sometimes such structures are seen projecting from the cervix.

Treatment.—The treatment of inevitable abortion consists in producing the steps involved in normal labor. In labor dilatation of the cervix is aided by uterine contractions which force the "bag of waters" into the cervix and by the upward pull of the cervical fibers around the presenting part of the child, as if pulled around a pulley. Continued uterine pains expel the contents, and further contractions of the uterus in the third stage loosen the placenta and expel it. Therefore the treatment of abortion consists in aiding dilatation of the cervix, in aiding the separation of the ovum and placenta, and in aiding the expulsion of the contents. At the same time the interests of the patient should be conserved by limiting the hemorrhage as much as possible. The very means which are best adapted to preventing an excessive loss of blood happen to be the very means which are of the greatest value in dilating the cervix. If an abortion is inevitable and if it is desired to carry out the procedure in the simplest manner, the following should be done with strictest surgical aseptic precautions. The vulva, the vagina, and the cervix should be thoroughly cleansed. With the aid of a bivalve speculum or with the aid of Sims specula the cervix should be grasped by volsellum forceps, and a long strip of iodoform gauze, its width depending on the dilatation of the cervix, should be introduced into the cervix and as much passed up into the uterus as possible. The cervix should then be packed as thoroughly as possible. The vagina, from the fornices to the introitus, should be packed with a very wide strip of iodoform gauze arranged in plaited form, thus furnishing a packing which completely and solidly fills the vaginal canal. With the aid of a T-bandage and gauze about the vulva the vaginal packing should be kept in place. Ergot, dram j, or ergotol, dram ½, should be administered every two or three hours. The vaginal packing prevents

the exit of blood from the uterus and hemorrhage is diminished to a minimum. Through the gauze within the cervix, dilatation of the cervix is produced. As a result of the packing in the vagina and the cervix the blood thus poured out in the uterus is retained within it. Contraction of the uterus compresses this blood, the poured-out blood dilates the uterus and cervix, accumulates between the ovum and the uterine wall, and is an important factor in peeling the ovum away from its contact with the uterine wall. Contraction of the uterus and the effort of the uterus to expel the ovum and clotted blood dilate the cervix. If this packing is removed at the end of twenty-four hours, the cervix will be found considerably dilated. The same steps as mentioned above should be repeated, if necessary, but a wider piece of gauze should be packed into the uterus and especially into the cervix. The vagina is then thoroughly packed and the use of the ergot is continued. It rarely takes more than forty-eight hours with this method to dilate the cervix so that it readily admits the middle finger (Fig. 72). At the same time the ovum and the chorionic villi or placenta are often completely loosened from the uterine wall. The cessation of uterine pains can generally be taken as proof of separation of the ovum. At the end of the forty-eight hours, then, the gauze is removed, and not infrequently the ovum is so situated that placental forceps introduced into the cervix can grasp it and remove it—sometimes the fetal sac with the embryo, at other times the fetal sac and then the embryo.

If the placental forceps do not grasp the loosened contents, chloroform is generally necessary, and the middle finger, under the strictest aseptic precautions, is introduced into the cervix and uterus; the other hand, pressing through the abdominal wall, pushes the uterus down into the pelvis and presses on the fundus (Fig. 72). In this way the middle finger of the internal hand can palpate the entire uterine cavity, can separate the whole ovum or the adherent parts or remove whatever of fetal sac or placenta is attached. After this procedure the placental forceps carefully introduced can extract whatever loosened contents are in the uterus. The uterus should then receive a very hot douche, with a double-running irrigator, of 1 per cent. lysol (Fig. 67). If the finger has been unable to separate any of the placental tissues, their location at

least is noted, and placental forceps or a large blunt curet are then introduced for their removal. The uterus is then packed with iodoform gauze and ergot is administered. The vagina is also packed with iodoform gauze. The gauze is removed in from twenty-four to forty-eight hours and ergotol, 15 minims, is administered every four hours. In incomplete abortion it is rarely necessary to use the sharp curet unless, in very early cases, the uterus is so small that the finger method cannot be used (Figs. 67, 68, 69). The use of the sharp curet is a dangerous thing. First, we are never sure that we have removed all the products of conception; second, perforation of the uterus occurs very readily. During the manipulation of the curet the uterus dilates and contracts easily, as it does in the post-partum period at full term, and if the curet is held very firmly, simple contraction of the uterus is enough to cause perforation by this sharp instrument.

It is by no means infrequent to find in abortions at the tenth or twelfth week, when an embryo is spontaneously expelled, that decidua, the sac of the ovum, or placental remnants are retained. These, as a rule, prevent the uterus from returning to normal size, the cervix does not contract, and there is generally a steady or irregular loss of blood. Under these circumstances the same method of dilatation of the cervix by iodoform gauze and of examination and cleansing of the cavity with the finger is most advisable. If this procedure is not possible, the dull curet should be used with the greatest of precaution (Figs. 67, 68, 69, 71). In using the curet in the uterus, it is essential to first measure the length of the uterine cavity with a sound, and then to place the index-finger of the right hand on the curet at a point which makes the distance from the tip of the curet to the finger a little less than the length of the uterine canal, as measured by the sound (Fig. 68). Curettage is then done, with the finger held firmly on this point, so that the instrument at no time enters further into the uterus than the measured length. The above described method of painless, slow dilatation of the cervix by the use of iodoform gauze is a safe and certain procedure. The above method of removing the contents of the uterus by the introduced finger is certainly the safest. The finger recognizes adherent tissues; it locates any tissue that cannot be scraped off; it cannot perforate the uterus. It makes diagnosis and carries out the treat-

ment. It should be used in every case in which the uterus is three times the normal size. Otherwise, instead of curage, curettage must be done (Figs. 67, 68, 69).

The diagnosis of incomplete is difficult when the cervix is closed. The continuation of pain speaks for the retention of the clots or of large masses, and bleeding continues. The uterus may be enlarged through the thickness of its own walls rather than through the size of its contents. The sound may show irregularities or roughness, but its use causes ready bleeding. Winter says that the larger and softer the uterus, the more does it speak for the retention of fetal and decidual products.

The death and retention of the embryo and ovum in the first months of pregnancy result in a diminution of the succulence and blueness of the vagina and cervix. The uterus becomes harder. Bleeding is less frequent than in abortion. The important aid in diagnosis is observation of the fact that the uterus does not increase in size in the course of several weeks, or that the uterus is much smaller than the length of the amenorrhea warrants. The chorionic villi may grow after the death of the embryo. Such an ovum is found to be covered by thickened decidua. Decidua serotina especially is thickened and infiltrated with blood. There is little amniotic fluid and the embryo may be present or degenerated. Such an ovum has been called bloody mole if fresh blood is present, and fleshy mole if decolorized old blood is present.

In some cases the entire placenta may be retained within the uterus. Bimanual examination shows a large uterus, often a dilated cervix, and the diagnosis generally made is submucous fibroid or chorioepithelioma. In fact, with very adherent placenta examination by the finger does not always make the differentiation. Such a placenta may be retained in the uterus a year or more, and if it undergoes no putrefactive changes the diagnosis is indeed difficult. More frequent is the retention of a decidua which does not undergo involution, but remains as a hypertrophied hyperplastic lining, giving rise to menorrhagia and repeated abortions.

Most frequent is retention of microscopic fetal cells in the form of villi or the cells which cover the villi, the cells of Langhans, and the syncytium. The most frequent causes of repeated abortion are syphilis, retroflexion, endometritis, fungoid endometrium, metritis and fibrosis uteri.

Abortion is most frequent in the third month, when the chorionic villi begin to atrophy, except at the serotina, the future placental site. The danger periods in repeated abortions are the omitted menstrual days, *i. e.*, the periods when menstruation would have occurred had no pregnancy taken place.

In bleeding occurring in the early months, when abortion is perhaps avoidable, the treatment consists of rest in bed, fluid diet, morphin by the needle or opium by suppository, and 2 grains of stypticin taken every two or three hours. Rest in bed is essential. For habitual abortion virburnum prunifolium should be given especially at the weeks corresponding to the omitted menstrual periods, and those weeks should be spent in bed. Standing, lifting, and work should be avoided. It is wise to let a long period of rest with treatment of uterine conditions precede the next pregnancy if the patient comes for consultation in the non-pregnant state. A syphilitic cure is advisable if examination or history points to this etiology. The husband must be sent to a specialist for treatment.

Injections result from bacteria present in the uterus (gonococcus) or introduced in attempts at artificial abortion, or introduced through lack of most thorough aseptic precautions during examination or treatment. Putrefactive bacteria growing on retained products cause a sapremic endometritis with disagreeable odor. Streptococci, staphylococci, gonococci, etc., invade either the endometrium or the uterine wall, or extend out into the parametrium, the tubes, the peritoneum, or produce a thrombophlebitis or a general septicemia. The treatment is found under Endometritis, Parametritis, Metritis, Salpingitis, Pelveo-peritonitis.

MYOMETRIAL DEGENERATION, FIBROSIS, AND ARTERIOSCLEROSIS

Causes of Uterine Hemorrhage.—In gynecologic hemorrhages, if those from the vulva, vagina, and portio vaginalis be excluded, visible bleedings are limited to the cervix and the uterus. Acute infections cause a certain amount of hemorrhage, but large losses of blood from the cervix are due either to carcinoma, sarcoma, myoma, or polyps, conditions easily diagnosed on proper examination. The intact lining of the cervix does not bleed, taking no part in menstruation. An affected lining of the cervix bleeds less frequently than the lining of the corpus uteri, for it takes but slight part in the physiologic swelling of menstruation.

Bleeding from the corpus uteri may be due to local conditions, to affections of the adnexa, to general physical disturbances, to nervous or temporary circulatory phenomena. The only normal uterine bleeding is menstruation. Every very strong menstruation or every irregular bleeding must be viewed as pathologic. If the uterus on examination be found enlarged, the following conditions must be looked for: myoma or sarcoma of the uterine wall; carcinoma, sarcoma, or large polyp of the endometrium; chronic metritis with endometritis; the complications of pregnancy, such as endometritis, placenta prævia, abortion, retention of placenta or decidua, chorioepithelioma, subinvolution, ectopic gestation. If the uterus be not enlarged, there may be present endometritis or a malignant change, or a degeneration of the myometrium or ectopic gestation. If on examination with a sound the inner lining feels smooth and even, the endometrium is probably normal. Of the secondary hemorrhages from the uterus, a not infrequent cause is acute pyosalpinx. In this category, above all, extrauterine gestation must be taken into consideration. Bleedings due to tumors of the ovary are rare, and if they do occur are the result of bilateral tumors, especially carcinomata. The peritoneal causes of uterine bleedings come under the head of pelveo-peritonitis; in that case the associated endometritis and periuterine exudate are the probable

causes. This holds true likewise of the bleedings complicating parametritis.

Climacteric Bleedings.—Among the other forms of decided uterine hemorrhage, the most important are the so-called bleedings of menopause. At the climacterium a gradual disappearance of menstruation, becoming less and less at each period, is rare. Without a previous diminution in the amount of blood lost periodically the menses, as a rule, are absent for one or two periods; they then return at the regular time, usually increased. The interval between the individual bleedings is rarely more than five or six months. The loss of blood, as a rule, does not reach a dangerous height, but these bleedings may occur often and last long. We may have at first a too early appearance of increased menstruation, and then later a delayed appearance of increased menstruation. In other cases there is a constant oozing of blood until the next flow appears. Even after a disappearance of menstruation for half a year or a year, a bleeding may again occur, so that it is difficult to say when a final cessation has taken place. In such cases endometritis, myoma, and carcinoma must be excluded, for if after an absence of six or more months a bleeding occurs, it should be considered pathologic until proved otherwise. Not infrequently there occur at the natural climacteric age, and likewise much earlier, the so-called climacterium præcox, most decided and long-continued bleedings, for which no apparent cause can be found.

We have at the menopause age, and also much earlier, hemorrhages without decided changes in the endometrium, and without the presence of new-growths. The bleedings are frequently stopped with difficulty and recur. These often continue in spite of rest in bed and the use of stypticin, hydrastin, ergotol. Even curetting and atmocausis have no effect, and not so very rarely hysterectomy is necessary.

Why do these profuse bleedings occur, and why is this condition found in younger women? What is the cause, what is the treatment?

This form of decided hemorrhage is due to fibrosis uteri, to degeneration of the myometrium, or to local uterine atrophic changes caused by a cessation of trophic function on the part of

the ovary and its secretion. Even though the only symptom is profuse hemorrhage, since the same changes are found in the uterus in unexplainable bleedings in younger women, we must view many of these latter cases as due to the same causes. Among the pathologic changes which are responsible for these bleedings, in addition to fibrosis uteri and myometrial degeneration is uterine arteriosclerosis.

Trophic Changes in the Uterine Muscle.—Halban found that castrated newly born guinea-pigs showed no future development of the genitalia, and no development of the uterine muscle. Knauer found, after castrating rabbits, that the uterus atrophied and that the intermuscular connective tissue was increased. Sokoloff castrated dogs and found that the uterus, especially the circular layer, became atrophied, the vessels were thickened, and their lumen became smaller. Jentzer and Beuttner, on castrating cows, found an atrophy of the muscle and of the glands of the uterus, and increased growth of the connective tissue and changes in the stratum vasculare.

After castration the uterus atrophies. Benkisser found that the vessels of a uterus, removed three months after castration, showed a sclerosis and an endarteritis obliterans. Eckhardt found, one year after castration, that the uterus of a woman was atrophied, the endometrium likewise, and that the connective tissue was increased. Gottschalk found, one and one-half years after castration, that, although the muscle of the uterus was well retained, the mucosa was atrophied and that the large vessels showed a folding of the intima. Therefore, after castration, the changes are like those occurring at the menopause. At and after menopause the uterus undergoes regressive changes, the portio shrinks, and we have the so-called senile uterus. The wall is thin and dry and contains much connective tissue; the vessels are thickened, narrow, and calcified. The mucous membrane is thin, flattened, and indurated.

This change occurs likewise in younger women, and is due to an early diminution of trophic and nutritional function on the part of the ovary, or to uterine atony dependent on constitutional causes. Why this early change in the ovaries should occur in certain cases we do not know, for in our discussion we exclude those conditions resulting from acute infectious diseases or periuterine inflammation.

Such atonic changes in the uterine muscle at climacterium, and increased changes of this kind in earlier periods, explain in part the irregular and profuse hemorrhages in some patients and the uncontrollable hemorrhages in others.

Elastic Fibers of the Uterus.—The elastic fibers of the uterus run between the muscle bundles, upon the surface of the bundles, they may surround a fasciculus or they may perforate it. In the stratum vasculare, where the elastic fibers come from the adventitia, finer fibers are found in the interfascicular connective tissue, but most of these are not connected with the main fibers. They are sometimes absent in the virgin uterus. Elastic and fibrous tissue, situated between the muscle bundles, sends branches between and around every muscle cell, but always at right angles to the long axis of the cell. The individual muscle cells of the stratum subserosum have therefore a perimysium elasticum and a perimysium fibrosum; the muscle cells of the stratum supravasculare and the stratum vasculare have a perimysium fibrosum and often a perimysium elasticum. The fibers of the stratum submucosum have only a perimysium fibrosum.

The important muscle fasciculi are furnished with a framework or elastic support which protects the fibers from overstretching and permits their return to normal position on contraction. This elastic framework is especially well developed in the outer layer and permits any change of form on the part of the fibers. This arrangement whereby the main amount of elastic tissue is placed in the outer two layers of the uterus has the advantage that it does not interfere with the contraction of the vessels; besides, any two points in the periphery are further separated, on dilatation of the uterus, than two points nearer the center, so that this supply is adapted to subsequent demands. The arrangement whereby the elastic fibers are arranged at right angles to the muscle fibers prevents any interference with contraction of the muscle and the vessels. The above-mentioned is the natural condition found between birth and the climacterium, namely, elastic fibers in the interstices of the muscle bundles and the muscle fibers (Pick).

Changes in the Elastic Fibers.—In the first half of pregnancy, so long as the myometrium grows, the elastic fibers undergo hyperplasia. The same is true of the parauterine and periuterine elastic

fibers. In the second half there is diminution, probably relative, through stretching; possibly, however, there is an absolute diminution. This seems to be irrational, in view of the future stretching to which the lower uterine segment is to be subjected during labor; but in pregnancy there is a huge increase in the elastic structures situated at the sides of the uterus and around the lower uterine segment, so that on subsequent dilatation there is no interference with the muscle fibers of the uterine wall. This vicarious growth of powerful parametrial and perimetrial elastic fibers, the course of the uterine fibers at right angles to the line of contraction of the muscle bundles, the network of elastic and fibrous perimysium about the individual fibers, the equal distribution and course of the fine elastic fibers in the external wall of the uterus, are ideal conditions; yet this typical arrangement is somewhat lost in pregnancy, and the vessels of the stratum vasculare show proliferation, and so do the elastic fibers of the intima.

During the puerperium, however, there is a decidedly increased formation of elastic fibers, and after labor their increase is permanent, hand in hand with a hypertrophy of the muscle fibers and a thickening of the vessels.

The typical arrangement of the elastic fibers is lost in pregnancy, at the climacterium, and likewise on the presence of myomata and in chronic metritis. The fibers are thickened and increased in number, and we might say that the typical arrangement is heightened in chronic inflammations, in the first half of pregnancy, and at the puerperium. The fibers are swollen through serous infiltration in pregnancy, in the puerperium, and in metritis exudativa. The fibers are degenerated in pus infiltrations. The fibers increase in thickness up to the age of fifty. After fifty they lose their continuity and become brittle and irregular. In old age they form lumpy groups in which the individual elastic fibers are to be scarcely recognized, and form groups around the arteriosclerotic vessels which are likewise grouped together. The elastic fibers disappear from the interfascicular connective-tissue interstices so that the circumvascular islands of elastic fibers lose all connection with each other.

In the senile uterus the elastic fibers of the corpus and cervix are increased. A like condition is found in castration atrophy,

and in addition the walls of the vessels are thickened and the elastic fibers in the adventitia are increased in amount. In older uteri there is then an increased supply of elastic fibers. This is not alone a local condition, but is part of a general increase, such as takes place in the kidney, liver, heart, spleen, etc., and is an attempt at compensation for the disturbed mechanical relations due to the loss of epithelial and muscular tissue. It is true then that the greater the atrophy, the larger is the number of elastic elements, and that an increase of elastic elements is present in all atrophies of the uterus, whether natural, artificial, or as a result of disease. The elastic fibers in the arteriosclerotic vessel walls of the stratum vasculare are increased and, passing out into the myometrium, they take the place of the muscle bundles, which is of itself a proof that the adventitia is a source for their formation.

We have, therefore, a hyperplasia of the connective tissue hand in hand with a gradual degeneration of the muscle fibers at climacterium and in climacterium præcox, so that a framework is formed in the uterine wall, in the meshes of which lie the degenerating muscle cells, accompanied by an increase of the fibrous perimysium, especially in the external layers. The elastic elements are thickened and lumped, likewise in the pericellular and interfascicular spaces. The stratum submucosum has naturally few elastic fibers, and we have here a lack of elasticity of the blood-vessels. Therefore, among the uterine alterations, we have a diminution of the muscle-elements, an increased amount of fibrous connective tissue, an increased amount of elastic connective tissue, an increased amount of elastic elements of poor quality. Even if the latter are not increased in amount they are thickened, brittle, and form polyp-like groups. The greater the hyaline and sclerotic changes in the vessel-walls, the greater is the amount of the elastic elements.

Arteriosclerosis.—Pichevin and Petit curetted a forty-one-year-old multipara for continued uterine bleedings, with no improvement. While performing a second curettage the bleeding from the uterus was so profuse that it was necessary to extirpate it. *Examination showed an increase in the number of vessels, which showed very much thickened walls, especially in the middle*

layer of the uterus. The muscularis was found almost substituted by vessels.

Marchesi reported a case of a thirty-two-year-old multipara who had aborted several times. For great bleedings abrasio was done, but the bleedings increased and a hysterectomy was performed. The uterus was found to be increased in size and its walls were filled with the gaping lumina of blood and lymph-vessels. Toward the mucosa the blood-vessels were increased, so that at this part the uterine structure had the appearance of cavernous tissue. The adventitia of the arteries showed an increase of connective tissue, the intima was thickened and uneven. Marchesi observed the occurrence of bleedings which were not controlled by abrasio, and where the endometrium showed no great changes. The pathologic condition is therefore a change in the vessels themselves. He quoted from the French literature six recent cases of this character showing no affection of the glands, of the interstitial tissue, or of the uterine parenchyma, but *decided changes in the vessels of the mucous membrane and the muscularis.*

Reinicke reported four cases, two of which suffered from uterine bleedings, which could not be controlled; the other two, in addition, showed, on examination of the scrapings, suspicious areas. In these cases ergot and ergotin were of no value, dilatation of the cervix and the application of liquor ferri brought only temporary relief, and extirpation was necessary. Examination showed that with *degeneration of the muscularis, the arteries had become stiff tubes.* All four cases showed a thickened media of the vessels and a growth of perivascular and intermuscular connective tissue. This condition is viewed as an arteriosclerosis.

Cholmogoroff reports two cases where the severity of the bleedings endangered life. No new growths or decided changes of the endometrium were present, and curetting brought no relief. The first case, a forty-two-year-old XI-para, had aborted six times. Her menstruation had become gradually stronger, returning every three weeks, and lasting for eight days, with a loss of much blood and many coagula. In the intervals fluor albus was present. Hydrastis and ergotin being of no avail, an abrasio was performed and showed no abnormal condition of the endometrium. After a bleeding which nothing could control, the uterus was extirpated.

On section, the vessels of the wall gaped. The mucosa was normal, the small vessels showed the intima to be thickened in spots, and almost obliterated. The muscularis showed an increase in the number of vessels, but this was possibly an illusion due to their twisted course. *All the vessel walls were thickened with a diminution of the lumen. The connective tissue was increased.*

The second case was a patient, twenty-one years old, who had aborted twice. Her menstruation lasted eight to ten days, and was very profuse, recurring every three and later every two weeks. Leukorrhea was also present. An abrasio showed a normal mucous membrane with hemorrhagic areas. The bleedings recurred so often and were so profuse that a hysterectomy was performed. The muscularis was firm and grated on incision. The vessels looked like pale strips on the cut surface and their lumina gaped. *The connective tissue was increased. There was a thickening of the arterial walls in the muscularis*, especially of the media and the intima. There was an increase in the connective tissue, especially that seeming to come from the adventitia of the vessels.

Arteriosclerosis is relatively frequent in women in the preclimacteric age. There seems to be a connection with frequent pregnancies, especially if these follow each other closely; in other cases there is a myomatosis or fibrosis uteri. We know from experience after castration that, on cessation of the ovarian secretion, there is an alteration in the thyroid and certain symptoms of hypersecretion of the hypophysis the same as after removal of the thyroid. The cessation or hypofunction of thyroid and ovary stimulates the adrenals, an effect which is supported through the hyperfunction of the hypophysis (Jaschke). It is a question whether there is a connection between the changes in the secretion of various internal glands on the one side and the preclimacteric and climacteric arteriosclerosis on the other side. The vessels of the genitalia, and especially of the uterus, are favorite areas for arteriosclerosis in women. Only in half the cases are signs of arteriosclerosis found in the other parts of the body (page 95). This arteriosclerosis of the uterine vessels may cause decided bleedings. There may, however, be no change in the muscles or vessels to account for metrorrhagia. There may be no changes in the mucous membrane, but there may be hypersecretion of the ovaries.

DIAGNOSIS OF MYOMETRIAL DEGENERATION, FIBROSIS, AND ARTERIOSCLEROSIS

We have, therefore, a very clear picture of the pathologic changes and of several distinct factors which make a diagnosis positive. When menstruation becomes severe, menorrhagia or metrorrhagia occurs, and no local changes in the endometrium can be observed with a sound or with the examining finger or in microscopic sections, we may take it for granted that one or all of the following conditions are present: (1) Degenerating muscle fibers poor in contractile power; (2) an increased amount of fibrous connective tissue; (3) an increased amount of elastic fibers, thickened and brittle; (4) arteriosclerotic vessels. Age is no criterion, since these changes may occur long before the natural climacteric period. If ergot, stypticin, etc., are of no avail; if no decided changes in the adnexa, sufficient to warrant their being considered the cause of the hemorrhage be present, if curettings show no altered condition of the endometrium; and if, above all, curetting does not control the hemorrhage, then the diagnosis of muscular degeneration, fibrosis uteri, or arteriosclerosis must be made. It is scarcely necessary to mention that myomata, sarcomata, carcinomata, and other local conditions are to be excluded on examination. In these cases of fibrotic uterus we usually are dealing with well built, strong women who bear even profuse bleedings well. Their ovaries are functionating too well and are producing congestions which the fibrotic uterus cannot control by proper contraction of the muscle, elastic fibers and vessels.

TREATMENT

What is the best method of treatment in these cases?

For the treatment of these bleedings see sections on Uterine Bleedings and on Atmocausis.

Aside from drugs, *uterine and pelvic anemia* must be produced by appropriate douches, sitz-baths, applications to the lower vertebræ, abdominal applications, by the intrauterine application of the positive electrode, by intravaginal pressure-therapy, and by cardiac tonics. A curetting, even though in these cases little endometrium is present, followed by iodoform packing of the uterus and the ad-

ministration for weeks of fifteen drops of ergotol several times a day, will diminish the size of a fibrotic uterus. Atmocausis, too, has a like effect. Soft, thin-walled, atonic uteri are not to be curetted.

If these therapeutic and mechanical methods do not stop the bleedings, vaginal hysterectomy must be done. This operation is one which I have been led to adopt in many cases, not so much because internal medication, sitz-baths, etc., for the production of pelvic anemia, curetting, and atmocausis have failed to diminish or correct the bleedings, but because patients, when assured of the slight risk of the operation, preferred to be freed of their annoyance at once rather than lead a quiet life without exertion and with long periods of rest, especially during the long menstrual periods. Besides, assurance that the above measures will avail cannot be given with certainty. The rest in bed after hysterectomy lasts no longer (not even so long) than the rest essential in these cases after curetting and atmocausis.

CARCINOMA

CARCINOMA VULVÆ

Psoriasis Vulvæ, or Leukoplakia.—There are circumscribed, white, slightly elevated areas on the inner surface of the large and small labia. Carcinoma often develops from these as it develops from like lesions on the tongue. So soon as the surface becomes papillary and infiltration occurs around the base, it is probably carcinoma. Carcinoma may also develop from the vulvar condition known as vulvitis pruriginosa.

Carcinoma of the vulva may begin in the glands situated around the external meatus of the urethra, in the prepuce or small labia. It is most frequent about the prepuce. It is more frequent than carcinoma of the vagina. It looks like carcinoma of the skin anywhere. It begins as a small, hard node which breaks down. Ulcers result which are elevated above the skin. There is infiltration about the ulcers. Then the ulcers grow deeper and the inguinal glands become involved.

Carcinoma vulvæ is of two forms, known as (1) cancroid, (2) infiltrating carcinoma.

Cancroid is a new squamous epithelium growth projecting above the surface. Degeneration occurs late, with the formation of a flat, slowly deepening ulceration with hard edges and infiltrated base. It is generally situated on the inner surface of the large and small labia and about the clitoris.

Infiltrating carcinoma is a large hard tumor, with deep extensive infiltration and extensive degeneration resulting in an ulcer with irregularly infiltrated edges and with a greasy base. Before ulceration a diagnosis is difficult. Superficial or deep infiltration, plus degeneration, makes the diagnosis. There are then warty, irregular, productive growths which are hard, especially about the base (Winter).

The conditions from which these affections may have to be differentiated are the following:

Pointed Condylomata.—They are pedicled growths covered with squamous epithelium and with a lobulated surface, and in some cases may be as large as a cherry, with a thin pedicle and lobulated surface. The papillary bodies of the skin have grown above the surface and are covered with thickened squamous epithelium. There is also connective-tissue papillary overgrowth, likewise covered by squamous epithelium. The process is superficial. There is no growing of epithelial strands deeply into the tissue, nor are there independent extensions of epithelial elements. Pointed condylomata of the vulva may be present on the large labia, especially on the inner side, or on the anterior or posterior commissure or on the perineum, or about the anus, and are generally the result of a neglected gonorrhea. They may form groups of growths of the above character. Pointed condylomata are often grouped, especially in pregnancy. They have then a cauliflower look and may show surface degeneration. The base is soft and degeneration is not deep. There are isolated papillomata in the periphery. They are to be diagnosed from carcinoma, but carcinoma of this size is eroded, bleeds easily, and degenerates.

Pointed condylomata are very often found in connection with gonorrhea, but not rarely, according to Joseph, after a chancroid. These, then, are contagious and produce after cohabitation the same form of excrescences on the infected person. Pointed condylomata may also occur with non-venereal conditions such as purulent or irritative vaginitis or vulvitis.

Chancre is a red, round ulcer. Its surface is smooth and gives off a serous exudation. It is sometimes very small and overlooked. The larger ones evidence greater induration and have elevated edges. Early benign glandular involvement takes place in the inguinal region, followed gradually by an involvement of all the glands of the body.

Broad Condylomata.—Mucous patches, or condylomata lata, are round, flat, gray elevations without pedicles. The epidermis on the surface is often softened, and sometimes through the loss of epidermis may leave a raw surface, especially at the center, as a result of which serum exudes. Older patches become rough and more warty. They are generally multiple and are usually situated on the small labia. Both sides are generally symmetrically involved by contact inoculation.

Chancroid is an ulcer with undermined elevated edges and no infiltration of the base. It occurs from inoculation by another chancroid. It is often accompanied by virulent bubo, *i. e.*, inflammatory involvement of related lymphatic glands. There are often contact chancroids, *i.e.*, inoculation by a chancroid of a surface in contact with it. Chancroid may occur on any part of the vulva, and may readily infect the hair-follicles. It has a tendency to heal from the periphery toward the center. It is generally found in puellæ publicæ. (See p. 546.)

Tubercular ulcers of the vulva are ulcers situated on the small labia and the frenulum and are covered by grayish membranes. They are of irregular form. The base is composed of cheesy tubercles and gray nodules. Tubercle bacilli can be found.

Ulcus Rodens Vulvæ.—On the posterior commissure, near the hymen, in the fossa navicularis, and extending into the perineal body is an ulceration with sharply outlined edges. The hymen is swollen and does not pit on pressure. Deep fistulas result which may extend even into the rectum. The rectum is ulcerated. The anus is surrounded by edematous blue or white hemorrhoids. The large labia are swollen, tense, and do not pit. If this ulceration extends higher, the urethra finally becomes destroyed and is surrounded by scars. There is edema and ulceration everywhere. The whole is characterized by a destructive hypertrophic ulceration. This condition is called by some lupus, by others elephantiasis, and by others ulcus rodens. Giant cells have been found, and are then considered by some as evidence only of a secondary tubercular involvement. Ulcus rodens is generally found in puellæ publicæ, and usually in those with a syphilitic history. It is not affected, however, by mercury or iodids, which possibly indicates that syphilitic individuals are very susceptible to this condition, whatever its nature may be. Veit considers that a close relation exists between ulcus rodens, so-called elephantiasis, and so-called tuberculosis. It may be stated that stricture of the rectum is proof, in a differential diagnosis, of the syphilitic nature of a lesion of this character.

Tertiary lues is evidenced by flat ulcerations of productive nature. The large and small labia and perineum are diffusely thickened, with resulting non-pitting edema or elephantiasis. The

whole has a bronze color and there is ulceration about the external meatus. The small labia may be perforated. There is deep infiltration. Characteristic is the flat ulceration with chronic edema. The rectum is often stenosed. In other cases the vulva looks red, rough, and eaten out without deep ulceration. The lesions are especially present around the urethra, perineum, and anus. There are pink rough growths, covered with skin, or deep defects or edema of the vulva. Sometimes the outer end of the urethra seems lost in the nodular eaten-out area, due to degeneration of the infiltrated tissues. It is to be diagnosed from tuberculosis or lupus. Tuberculosis of the vulva resembles tertiary syphilis. The diagnosis is made by the finding of the tubercle bacilli. Stricture of the anus is frequently observed in syphilis.

CARCINOMA VAGINÆ

Carcinoma of the vagina generally takes the form of flat infiltrations which affect part or all of the vaginal wall, especially the posterior wall. There is early ulceration of the surface. Occasionally vaginal carcinoma takes the form of large tumors of broad extent filling the lumen of the vagina. They ulcerate late. It occasionally takes the form of irregular, papillary, bleeding projections lying on the surface and affecting the whole vagina without deep infiltration. The first form may extend under the mucosa gradually and involve the whole length of the vagina, making it scarcely passable for one finger. It involves the bladder and rectum. Carcinoma of the vagina is characterized by superficial infiltration in the form of nodules or flat tumors. Ulceration makes the diagnosis certain.

Sarcoma of the vagina causes flat ulcerating infiltrations or rounded tumors covered by mucosa. Sometimes there are grape-like bodies, also found in children. Otherwise it is not to be diagnosed clinically from carcinoma.

CARCINOMA OF THE PORTIO

Carcinoma of the portio, or vaginal portion of the cervix, either grows out and projects into the vagina or grows inward and infiltrates the portio (Winter). It originates from the squamous covering.

I. *The polypoid or cauliflower form* either has a broad base or is pedicled with a base the thickness of a finger or more, and is of the size of a hazelnut up to a fist. The surface is irregular, rough, brittle, and generally covered with gangrenous masses. If it degenerates slowly, it is characterized by infiltration. If it degenerates quickly, it is characterized by ulceration. Cauliflower carcinoma of the portio is easily diagnosed by the finger and the eye. It presents a growth in polypoid form on the outer side of the portio. Its surface degenerates and is rough and brittle. A probe penetrates into it easily. Portio carcinoma may be flat on its surface. Every growth above the surface, especially if at first very hard, is ominous (Fig. 137).

Fig. 137.—Cauliflower carcinoma of the portio vaginalis of the uterus (in longitudinal section) (Winter).

Fig. 138.—Infiltrating carcinoma of the portio. The carcinoma infiltrates one lip and the neighboring fornix, but is still covered by intact squamous mucosa (Winter).

II. In the *infiltrating form* there is thickening and hardening of the portio. The infiltration extends to various depths of the cervix, rarely above the fornices. The surface shows little loss of substance. Sometimes the surface is intact. It is then a carcinoma in the substance of the portio and therefore an infiltrating carcinoma. The cervix is like cartilage. The cervix is broad, plump, and irregular. The diagnosis, in the presence of a hard and smooth surface of the cervix, is difficult. The diagnosis is easy when the cervix ulcerates and degenerates (Fig. 138).

III. *Carcinomatous cavity.* There is a funnel-shaped hole in the cervix resulting from ulceration and generally situated in one lip. The hole runs parallel to the cervical canal or extends into it (Fig. 139).

Fig. 139.—Carcinomatous cavity in the portio (Winter).

IV. *Carcinomatous ulcer or ulcus rodens* is a flat ulceration on the cervix with no tendency to extend into the depth of the cervix, but with a tendency to extend superficially, generally on one lip. It spreads to the fornices and vagina, rarely into the cervical canal (Fig. 140).

Ulcerative carcinoma on the portio is recognized if a depression is formed, with uneven, rough, degenerated wall and hard surrounding tissue. If the depression is only slight, we depend on the eye to recognize degeneration. The polypoid form and ulcus rodens have a greater tendency to spread to the vagina, and do so, superficially. The others spread into the vagina through the submucous tissue and represent infiltrations in the vagina covered by mucosa, which infiltrations may extend down to the introitus. The infiltrating form and the carcinomatous cavity rarely extend above the internal os. They involve the connective tissue, that is, the parametrium, generally posteriorly and laterally. Bladder and rectum are seldom reached.

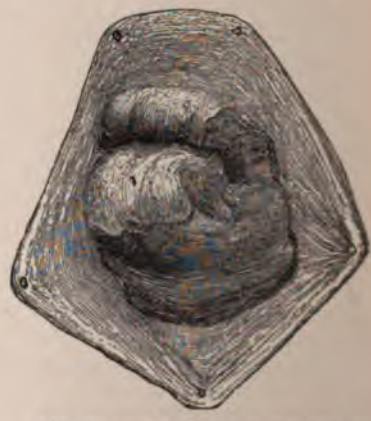

Fig. 140.—Carcinomatous ulcer, or ulcus rodens, on the posterior lip and the neighboring fornix (Winter).

Carcinoma of the portio takes its origin from the squamous epithelium or from erosions.

Carcinoma of the portio occurs in different forms, according as it takes its origin from the squamous epithelium or from erosions. The form which comes from the squamous epithelium is called *cancroid*. The form which comes

from the erosions may be squamous in character, due to a metaplasia of the cylindrical epithelium, or there may be no metaplasia.

Clinically carcinomata of the portio are either ulcers or cauliflower tumors.

Carcinomatous ulcers of the portio have a hard infiltrated periphery with a greasy base. In the early stages they may be mistaken for chancre. These ulcers may occur on one or both lips of the cervix or around the external os. They may have grown deeply, leaving the surface relatively intact and forming round nodes in the tissue. When these break down, the surface is destroyed and little cavities occur in the portio.

In a differential diagnosis the following conditions must be considered:

Pointed Condylomata of the Cervix.—In pregnancy they may be very close together and may form a circumscribed tumor on the external surface of the cervix and give the portio an irregular papillary surface. The base is not infiltrated, there is no real ulcer, they look whitish-red, and others may be found in the vagina and on the vulva.

Ulcus simplex hemorrhagicum is not large, is sharply outlined but not very deep. There is small-celled infiltration with dilated vessels. There is no epithelium on its surface and very few glands, if any. The cause is not known.

Erosions are situated around the external os; have a very red color and a shiny surface, no sharp outlines; there are often follicles on the cervix. There is cervical catarrh. If clean, they are easily diagnosed from carcinoma, with the possible exception of that form known as erosio-papillaris with rough surface. If the surface becomes infected and covered with a membrane, it is often hard to diagnose from a carcinoma except by microscopic examination of an excised bit.

Erosion ulcers are different from erosions and are distinguished by the microscope as follows: Erosion glands with cervical cylindrical epithelium in them lie in small-celled infiltrated tissue which is rich in vessels. The tissue of the portio is deeply infiltrated by glands. Through local treatment, injections, etc., there results a loss of substance. There is diffuse infiltration and a development of the large vessels.

Decubitus Ulcer.—When due to the presence of a pessary, it is situated directly on the spot where the pessary presses. It has a sharp border and ulcerative base. The base, however, is not infiltrated and heals easily. It is generally not immediately about the external os. It is also frequently present with prolapse of the uterus. It then shows a large loss of substance on the cervix extending into the vagina.

Chancre in the early stages is hard to differentiate. Later on it is a flat ulcer with an infiltrated cartilaginous base, sharply outlined and covered by adherent yellowish-gray membrane, and may be single or multiple. The spirochæte pallidum is to be found. Constitutional symptoms result.

Mucous patches are white or yellow and elevated with degenerated surface and multiple. They are also present in the vagina and vulva, where they are not ulcerated.

Gummatous ulceration is situated near the external os, often affecting both lips, and is sharply outlined. There is a yellow covering over bleeding granulations. Gummatous ulceration breaks down slowly. There is a crater-like deepening. There is peripheral extension with serpiginous outline.

Ulcus Molle.—Soft chancre is a rapidly spreading ulcer with punched-out, elevated, undermined edges. The base is not infiltrated. Membranous spots are on its surface. Such ulcers are often multiple. Contact ulcers are present and other ulcers in the vagina and on the external genitalia are noted.

Tuberculous Ulcer.—Ulcer with undermined edges, partly sclerosed. Situated about the external os. Yellow irregular base which is not infiltrated. Microscope shows small-celled infiltration area with degeneration and detritus. By microscope many giant cells are found. Finding tubercle bacilli makes the diagnosis.

Ulcerative Carcinoma of the Portio.—If superficial, it is hard to diagnose. It has a yellowish-gray surface which is irregular and papillary. The base is infiltrated and the character of the ulceration conveys the impression of loss of substance. If deep, there is seen an ulcer with an uneven, rough, destroyed base. There is infiltration about it. Evidences of degeneration and destruction are present. It can be easily penetrated by the sound or finger. One can easily tear off the fragile tissue with the finger. Such brittleness of tissue is always suggestive of carcinoma.

CARCINOMA OF THE CERVIX

A carcinoma which starts from the lining of the cervix may, like some cases of carcinoma which start from erosions, show a change of the cylindrical epithelium to squamous epithelium with solid cell groups invading the cervical wall. On the other hand, the glands of the cervix generally produce a growth of cylindrical eipthelium resulting in an adenomatous carcinoma. Clinically, cervix carcinoma is often a polypoid tumor starting from a benign mucous polyp. In other cases the wall of the cervix is diffusely infiltrated, and when degeneration occurs a large cavity is present.

Fig. 141.—Infiltrating carcinoma of the cervix (Winter).

Infiltrating Carcinoma.—There is an infiltration in the cervix formed through a thickening of the wall. There is little tendency to ulceration. It is simply a large nodule covered with intact mucosa till the latter becomes thinned out and infected. The mucosa remains long intact. Infiltrating carcinoma is hard to diagnose. The cervix is infiltrated but still covered with mucosa. The cervix is enlarged, thick and plump, hard as cartilage, but often elastic. As the carcinoma approaches the external os, we may see yellow points of degeneration and can easily rub off the superficial areas. When the carcinoma approaches still nearer, it breaks down and looks like a primary portio carcinoma. It is easy to overlook this growth if it is in the cervical canal and above the external os. It is to be diagnosed from metritis colli and follicular hypertrophy, from interstitial myoma, and from chronic cervical catarrh of older women. The curet and microscopic examination are then necessary to aid in the diagnosis (Fig. 141).

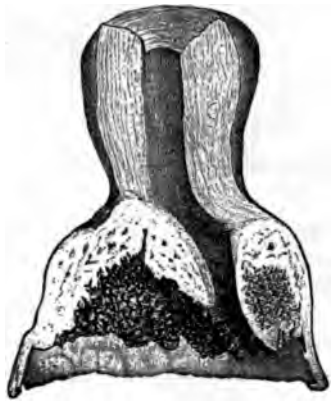

Fig. 142.—Carcinomatous cavity in the cervix, occurring through degeneration of an infiltrating carcinoma (Winter).

Metritis colli with lacerations may resemble an infiltrating carcinoma, but the whole cervix is usually involved. There is a surface of smooth mucosa. The resemblance to carcinoma is marked if the portio is filled with dilated follicles.

Follicular Hypertrophy of the Cervix.—There is a smooth covering of the portio, through which we see dilated follicles. The surface is not rough or papillary, the consistence is not brittle. Follicular hypertrophy of the cervix is distinguished from carcinoma by the presence of dilated erosion glands. Under the microscope the epithelium in the follicles of Naboth is of a single layer and cubical.

Fig. 143.—Ulcerating carcinoma, with destruction of almost the entire cervical canal (Winter).

Carcinomatous Cavity.—This follows degeneration of the infiltrating carcinoma (Fig. 142).

Ulcerative carcinoma involves the cervical canal superficially. It does not grow deep, but it degenerates quickly, therefore a large space is formed with a thin wall which is not infiltrated (Fig. 143).

Those carcinomata in the cervical canal which by ulceration have opened out upon the external surface of the portio are diagnosed by the rough, raw, brittle walls of the cavity, especially if there is infiltration of the surrounding tissue. If the finger can enter the cervical canal, it feels the irregular thickness and the rough surface with a fragile, brittle consistency. If the curet is used in the cervix and very gently applied, much tissue can be removed, and the diagnosis of carcinoma is then beyond doubt. These forms may extend into the vagina, but may also involve the vagina under the mucosa by infiltration. *They readily involve the parametrium.* The bladder is involved early, the rectum late.

CARCINOMA OF THE FUNDUS

Carcinoma of the fundus starts from the mucous membrane and includes the so-called adenomatous carcinoma, formerly often

called *adenoma malignum*. This is now considered as genuine carcinoma. Carcinoma of the corpus may begin from a mucous polyp. Uterine carcinoma may be circumscribed, or it may be diffuse.

I. **The Diffuse Form.**—Carcinoma of the fundus comes from the uterine mucosa. The diffuse form affects the whole mucosa and produces irregular thickenings and villous outgrowths with infiltration of the wall and thickening of the whole uterus. It finally grows through the entire wall (Fig. 144).

Fig. 144.—Diffuse carcinoma of the fundus uteri (Winter).

II. **The Circumscribed Form.**—Like I, only circumscribed (Fig. 145).

III. **The Polypoid Form.**—The polypoid, thin-pedicled form is rare. There is a polyp filling the uterine cavity which is soft, brittle, and degenerating. It may grow externally into the wall or internally into the uterine cavity.

The only parametrial tissue which becomes involved is the ligamentum latum. The peritoneum becomes involved by growth of the carcinoma through the uterine wall. Metastases into the ovaries occur.

Fig. 145.—Circumscribed carcinoma of the fundus uteri (Winter).

CHARACTERISTICS OF CERVICO-UTERINE CARCINOMA

Carcinoma of the uterus has a tendency to superficial degeneration. It furnishes, therefore, an excellent medium for the growth of micro-organisms, which include not only saprophytes but also streptococci and other pathogenic organisms. This explains the fever occurring with carcinoma. This destruction of carcinoma results in arrosion of the blood-vessels and explains the characteristic bleeding which occurs on coitus, on examination, or independently.

Carcinoma of the cervix or of the corpus may extend upward or downward and by direct continuity involve the entire uterus. In addition, cervix carcinoma may produce metastases in the fundus and a fundus carcinoma may produce metastases in the cervix. Frequently there occur implantation metastases in the vagina through direct implantation of cast-off cells or through retrograde lymphatic extension. Carcinoma readily grows through the uterine wall, especially carcinoma of the cervix, and readily enters into the connective-tissue parametrium. This may involve the ureters, or the bladder, or the recto-uterine space, or the general peritoneum. In the end-stage of a uterine carcinoma there is a complete filling of the small pelvis with a firm mass in which the various organs cannot be differentiated, resulting in compression of the rectum and ureters and the formation of fistulas. Earlier than the occurrence of direct growth into surrounding tissue there occur metastases into distant structures through lymph-channels. Involvement of the lymph-glands of the pelvis may occur in the very early stages (Winter).

1. Carcinoma of the portio involves the hypogastric lymph-glands situated between the external iliac artery and the hypogastric. A few lymph-glands in the ligamentum latum, situated where the uterine artery and the ureter cross, are often involved early. The internal inguinal glands are involved early.

2. Carcinoma of the cervix. In addition to the hypogastric and internal inguinal glands, the internal sacral glands between the hypogastric artery and the rectum, as well as the external iliac glands situated external to the external iliac artery, are involved.

3. Carcinoma of the fundus involves the external iliac glands and the inferior lumbar glands situated on the common iliac artery, and the superior lumbar glands situated near the lower end of the aorta. In advanced cases all these glands and other glands up to the diaphragm may be involved and metastases may occur in any of the organs of the body. Lymph-glands are often swollen without their being infiltrated by carcinoma. This inflammatory involvement of the glands may be caused by the numerous micro-organisms present in the carcinoma.

Most malignant is carcinoma of the cervix, because it spreads

readily through the uterus and involves the lymph-channels and paramatrium. Carcinoma of the portio is almost as dangerous. Least hopeless is carcinoma of the corpus, because involvement of the lymph-channels and broad ligaments occurs late.

The majority of cases of carcinoma occur in women who have borne children. Hofmeier found only 5 per cent., out of eight hundred and twelve cases, in women who had not borne children. The average number of labors was eight.

SYMPTOMS OF CARCINOMA OF THE PORTIO, CERVIX, AND UTERUS

Two important symptoms of portio carcinoma are bleeding on cohabitation and post-climacteric hemorrhage, especially when coming on several months after menopause (exclude myoma, polyps, disease of the vessels and tender senile endometrium). Another symptom is irregular bleeding. Another symptom is discharge, either foul, bloody, and mixed with tissue particles, or sero-sanguineous, like meat-juice. The diagnosis depends on the evidence of new-growth and infiltration plus degeneration.

The symptoms of carcinoma of the cervix are not characteristic in the early stages. In older women menstruation has generally ceased and then recurs. In other cases menstruation does not cease, but continues abundantly. Often the first symptom is bleeding on coitus. The loss of blood at first may take the type of menstruation, but is abundant. Then bleeding occurs irregularly on coitus, on the performance of any act involving effort, or with the straining at stool associated with constipation. There is usually a loss of mucus stained with blood. Characteristic is the disagreeable odor and the thick, brown character of the blood. This is usually due to superficial degeneration of the carcinoma.

Pain may be absent entirely until toward the end. Sometimes it is present in the beginning. Some patients complain of backache, while others complain of peritoneal irritation. Then comes cachexia, loss of weight and strength. If the bladder is infiltrated, there is frequency of urination and painful urination. If the rectum is involved, there is tenesmus and difficulty in passing feces. Hemorrhoidal bleeding and pain in the anus are noted. Patients often complain of sleeplessness and restlessness, and

especially marked is the loss of appetite. Not infrequently sexual desire is increased.

In the very early stages the diagnosis can be made only by microscopic examination. It is of the greatest importance to make a test excision in every suspicious case, because the clinical symptoms resemble those of chronic metritis, of erosions of the cervix with hypertrophy of the cervix, and of ulcers of various forms. Winter finds the cystoscope of great importance in diagnosing infiltration of the precervical connective tissue. However, the projection of the trigone, swellings of the mucous membrane of the bladder, hemorrhage in the mucosa, œdema bullosum, changes in the openings of the ureters, and papillary excrescences all resemble closely the same changes occurring in precervical inflammation due to bacterial involvement.

Corpus carcinoma occurs in the proportion of 10 per cent. of cases of uterine carcinoma. It occurs most frequently during and beyond the menopause. "Chronic endometritis with long-continued profuse menstruation" is a frequent history. Corpus carcinoma is characterized by its gradual development. It has been observed to be confined to the body of the uterus for five years. This tendency to very late spreading into the parametrium explains the good results obtained by early operation.

The symptoms of corpus carcinoma include: (1) A long continuation and a profuse character of menstruation. The recurrence of menstruation after a shorter or longer period of cessation is a symptom of great importance. (2) An additional symptom of importance is the discharge of watery fluid, later taking on the character of meat extract, and finally becoming purulent and foul-smelling. When degeneration occurs the discharge is extremely disagreeable. (3) The third symptom is pain in the back and legs and severe pain in the abdomen. Almost pathognomonic when they do occur, are colicky pains occurring at certain hours of the day and finally ending in a foul bloody discharge containing tissue detritus. Not infrequently there occurs peritoneal pain through extension of the carcinoma under the serosa. The uterus is often enlarged. Carcinoma of the fundus occurs in the majority of cases beyond the climacterium. It is not to be diagnosed by bimanual findings. Irregular bleeding, sero-sanguineous flow,

especially if fetid, and intermittent uterine colic are the symptoms. In the early stages the uterus is normal. In the later stages the uterus is thicker, larger, and irregular, as with myoma or metritis. The repeated examination of scrapings is essential. The history of a return of menstruation plus the discharge and the pain, added to the size, hardness, and irregular feel of the uterus, distinguish a carcinoma from a myoma.

It is to be diagnosed by examining the cavity. Curet the whole endometrium for examination by microscope. Examination with the finger shows new-growth plus degeneration. There is a circumscribed or diffuse, hard, infiltrating thickening, or else the infiltration of a carcinomatous ulcer is felt or else papillary growths or brittle tumors are noted.

If the carcinoma does not remain limited to the uterus, there is local extension to the vagina, parametrium, bladder, and rectum.

The neglect, on the part of patients, to consult physicians on the first appearance of bloody or sero-sanguineous discharge, especially at the climacteric age or after menopause; the failure, on the part of physicians, to make a thorough bimanual and tactile examination, and to examine thoroughly with the aid of a speculum and the use of the sound; the failure to make test excisions and test curettings for the purpose of microscopic examination; the failure to consider all cases at this period and even much earlier as malignant unless another diagnosis can be positively made; all these are factors in making cervico-uterine carcinoma the almost hopeless disease that it is. Cervical carcinoma, situated in an area surrounded by the six connective-tissue ligaments and by additional connective tissue, all rich in lymphatics (especially the broad ligaments), is such a dangerous disease because of the readiness with which secondary extrusions of the malignant process invade the periuterine tissues. Were these cervical carcinomata seen before such invasion of the surrounding tissues and before invasion of the pelvic glands, carcinoma would furnish immeasurably better results and recurrences would be markedly fewer in number. Carcinoma of the fundus invades the blood ligaments very late because the amount of lymphatic connective tissue in the upper part of the broad ligament is slight. In the lower half of the broad ligament the lymphatic supply is abundant. Yet in this lower area of the uterus, in the

cervix whose outer covering is exposed to the eye and whose canal is so readily entered by the sound or curet, that is, in that part of the uterus which nature has selected for the location of the largest number and the most malignant of uterine carcinomata, the development of carcinoma is not looked for nor recognized with the frequency that is possible nor with the care and attention that constitute a duty. Carcinoma of the uterus has a mortality which can be reduced immeasurably, if these facts are taken to heart and if the laity are made aware of the meaning of the premonitory symptoms of irregular bleeding and sero-sauguineous or disagreeable discharge, especially when either of these symptoms occur at the menopause age or after the amenorrhea of the climacterium.

TREATMENT

Therapy consists in total extirpation of the uterus, ovaries, tubes, broad ligament, pelvic connective tissue, and of enlarged retroperitoneal glands. As regards prognosis, Winter finds in 53 per cent. permanent cure by radical operation in favorable operable cases. If radical operation cannot be done, local treatment may keep the patient in a comfortable state for a long period.

In the treatment of inoperable cervical or uterine carcinoma the degenerated tissue should be removed with a curet or with a sharp spoon. Care is necessary not to invade the bladder, the rectum, and the cul-de-sac of Douglas. The denuded bleeding area of the cervix is then cauterized with a Paquelin or with the electric cautery, gently applied, not so much for the effect of actual contact of the cautery, as for the effect produced by the heat. In place of the cautery pure nitric acid may be used. The resulting cavity is then packed with cotton, covered with tannic acid and iodoform equal parts, and the vagina is packed with sterile gauze. These are left in place for three days.

Martin recommends the use of cotton soaked in pure liquor ferri sesquichlorati for packing the cavity in the cervix after the previous cauterization. These procedures are to be renewed after the lapse of weeks or months if the injury to the bladder, rectum, and peritoneum can be avoided. For the discharge, douches of lysol or carbolic acid or thymol are of value. Peroxid of hydro-

gen may be injected into the vagina or applied through a vaginal speculum.

In the end-stages any drugs which relieve pain and suffering should be administered by mouth, rectal or vaginal suppositories, or by needle. The removal by spoon or curet of the degenerated tissue diminishes the bleeding, removes the foul discharge for long periods at times, and aids in improving the nutrition of the patient.

CHORIOEPITHELIOMA

A fecundated ovum embeds itself in the lining of the uterus through centrifugal descent. The ovum then causes a reaction in the surrounding tissue, and a dilatation of the surrounding lymph-spaces, so that a resulting localized edema takes place. In addition, a dilatation of the capillaries is produced.

The Trophoblast.—The outer layer of the ovum develops into what is known as the trophoblast, which is a product of the ectoderm, and from it develop the cells of Langhans and the syncytium.

Shortly after the ovum is embedded in the mucosa a connection between the trophoblast and the maternal blood takes place through a rupture of the capillaries. The maternal blood then bathes the ectodermal trophoblast. This opening of the maternal vessels occurs, however, before the formation of villi; and the cells of the trophoblast may therefore enter the maternal veins at the very earliest period.

A gradual transition of trophoblast cells into syncytial cells, and a gradual change of trophoblast nuclei to syncytial nuclei, take place through the corrosive action of the maternal blood, and elements of maternal blood aid in forming the syncytial protoplasm. The syncytium does not originate from the maternal endothelium, or from the uterine epithelium, or from the decidua cells (Fig. 136).

Just as in the early stages the trophoblast invades the decidua, so after the formation of villi the future course of the ectodermal trophoblast and of the syncytial cells is of a destructive character, so far as the decidua is concerned. The trophoblast and syncytium invade the maternal tissue and mingle with it. They infiltrate the decidua and bring it to destruction. The trophoblast and syncytial cells erode the capillaries and blood-vessels, the blood in turn changing fetal cells to syncytium.

The invading trophoblast and syncytial cells have at all times a great power of wandering. They enter between bundles of muscular and connective tissue, into the lymph-spaces and into the

blood-vessels. At full term the uterine wall is infiltrated with fetal cells of a syncytial character.

From the very earliest moment fetal cells are continually entering the blood of the mother, not only in the primary intervillous space, but in the fully formed intervillous space, as well as through the vessels of the uterine decidua and wall.

Characteristics of Chorioepithelioma.—There have been observed and reported several hundred cases of a uterine growth of exceedingly malignant character, occurring after abortion, hydatid mole, and labor, or even after tubal abortion.

The clinical symptoms are: (1) Pronounced uterine hemorrhage, recurring even after repeated curettings; (2) very early metastases, especially in the lungs and vagina; and (3) early death through hemorrhage, cachexia, or septic infection.

Macroscopically, these tumors are more or less localized, ulcerating, degenerating, hemorrhagic growths, frequently passing deeply into the uterine wall, or through it with involvement of the peritoneum.

Microscopically, these tumors are characterized by hemorrhagic areas, areas of degeneration, the presence of fibrin, and the involvement and invasion of capillaries and large vessels. They are especially characterized by the presence of (1) pale round and polygonal cells with pale protoplasm and pale nucleus, and (2) large round and spindle-shaped cells with dark nuclei, and also (3) large, irregular branches composed of multinuclear protoplasmic masses (syncytium).

These typical growths have been variously described as sarcoma, carcinoma, carcinoma after abortion and labor, and as sarcoma causing abortion.

Sänger, in reviewing these cases, found a decided resemblance in their characteristic elements, and came to the conclusion that the decidua cells were the cause of the growth, giving it then the name decidual sarcoma or decidua malignum.

As a result of the investigations of Fraenkel, and later of Marchand, attention was called to the fact that those cells which so closely resembled decidua cells were really of fetal origin, and were, in fact, the cells of Langhans, while the spindle-shaped and grouped masses of multinuclear protoplasm were of syncytial origin.

From all sides, especially in England and Germany, this view was attacked. It was pointed out how baseless was the statement that fetal cells could produce a growth of this malignant character, differing from carcinoma only in the fact that metastases resulted through the blood-channels instead of through the lymph-channels.

A few years ago the controversy was not entirely settled, many holding the view that these tumors were sarcomata and originated from the decidua cells. The giant cells and the protoplasmatic masses were referred, likewise, to changes in the decidua. Others held that these growths result from the epithelial covering of the villi. That these cells, if they are of fetal origin, should be mistaken for decidua cells is a natural error, for we know that even in the normal processes a positive distinction is often very difficult. It is to be noted that many investigators have mistaken the typical trophoblast cells in tubal placentation, too, for decidua cells. Still others leaned to the view that the stroma of the villi plays a part.

On the other hand, among those who hold that these growths originate from the chorionic covering, a division of sentiment existed, for those who consider the syncytium and cells of Langhans to be of uterine origin classed these growths as carcinoma and sarcoma of a somewhat atypical character. Those who believed, as we have shown, that the eipthelial covering of the villi is of fetal ectodermal origin, and who also classed these tumors under the category of carcinoma, have introduced into pathology a new element. ("Uterine and Tubal Gestation," Wm. Wood & Co., 1903.)

A factor which has served to clear our views in these various disputed points is the knowledge that 50 per cent. of these malignant uterine growths, commonly known as deciduoma, follow the presence of hydatid mole.

Histopathology of Chorioepithelioma.—In hydatid mole we find the same elements as in normal placentation, only that these elements are excessive in number and size. Hydatid mole represents a hypertrophic growth of the chorionic covering, accompanied by dropsical swelling of the chorionic stroma. As is well known, the covering of the villi consists of two layers—an outer, syncytium, and an inner, the cell layer of Langhans. The growth concerns both the syncytium and the cell layer of Langhans. The

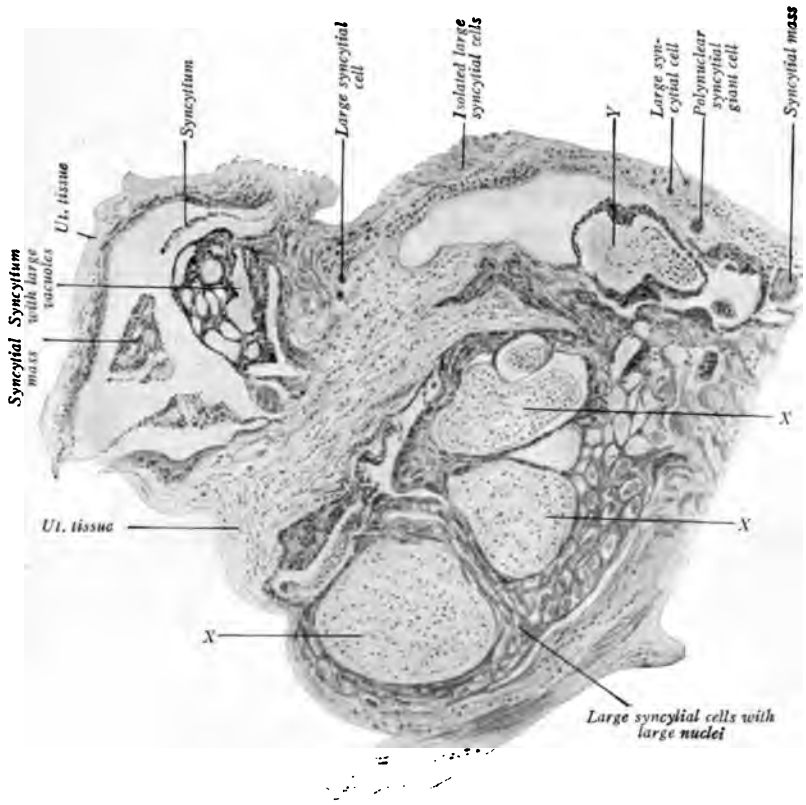

Fig. 146.—Low-power drawing of the typical form of chorioepithelioma, showing the uterine wall invaded by chorionic elements. *X*, *X*, *X*, three areas of dense connective tissue surrounded by chorionic epithelial elements and resembling chorionic villi. *Y*, connective tissue center surrounded by polynuclear syncytial mass of considerable thickness, probably a villus.

abnormal element is the occurrence of very large cells with immense nuclei in large number, and a decided growth of the syncytium, accompanied by the formation in the latter of large vacuoles.

Leaving out of consideration those cases malignant because of the diffuse and deep infiltration of the uterine wall by the cystic villi, by no means are all hydatid moles of a malignant character. A method of distinguishing between the benign and malignant cases was proposed by Neumann. He observed in three cases subsequently resulting in the so-called deciduoma, large cell elements in the stroma of numerous villi, which he considered to be infiltrating elements of the syncytium. He observed, further, an abnormal infiltration of cell groups through such syncytial elements. But investigation of subsequent cases shows that malignant forms are not always preceded by such changes in the hydatid mole, while others have found these changes and yet no malignant growth has occurred.

Even the occurrence of metastases is no proof of malignancy, for Pick reported a case with a metastasis of villi in the vagina, and yet the patient recovered. We know that fetal cells are given off at all stages from the normal placenta into the maternal circulation. Even the normal placenta, as Pick believes, may give off metastases of villi, and these may (1) degenerate, or (2) grow slightly, or (3) produce the same syncytial growth as is observed in benign hydatid mole; and (4) primary malignant growths may originate, and have originated, from such metastases.

Typical and Atypical Forms.—Under chorioepithelioma we distinguish two forms, the typical and atypical. In the typical forms we find large, round, polyhedral cells, with strikingly large, very irregular, lobulated nuclei, which stain very deeply and often degenerate, forming vacuoles. The protoplasm is relatively scanty. These cells are capable of great wandering and are found more or less isolated between the muscle and the connective-tissue bundles, in the lymph-spaces, and in the vessels. They form the advance guard in the way of infiltration. There are, further, irregular bridges of protoplasm containing scattered or grouped nuclei of various sizes.

Many of these groups of nuclei are the same large, irregular, lobulated nuclei as were observed in the form just mentioned.

In addition are found irregular masses of protoplasm containing many small nuclei. The character of the latter is identical with normal syncytium.

The irregular groups of protoplasm containing grouped nuclei of various sizes are undoubtedly of syncytial character, for they result through the blood surrounding and infiltrating the cells of Langhans, and it is very evident that these cells form the aforementioned grape-like nuclei. The isolated large cells are likewise of syncytial character. They have generally been mistaken for decidua cells. They may be distinguished from the cells of Langhans, for the latter are pale, polyhedral groups of distinctly epithelial character. They are rich in glycogen, and therefore often contain vacuoles. The nuclei are large but pale.

The cells of Langhans are illustrated in the atypical form, where the syncytial elements are relatively in the background. In fact, no more and no different syncytial cells are present than in normal gestation. The trophoblast cells lie closely grouped and surrounded by syncytial elements in quite the same manner as in normal gestation, or especially in tubal gestation. They are polygonal cells, concerning which different views have been held. They have been called decidua cells. No vessels of their own, however, are present in these epithelium-like groups, and their character, their structure, and their arrangement so closely resemble the trophoblast cells observed in normal gestation that any other view is not to be considered. These epithelium-like cells and the syncytial masses of various forms all originate from the trophoblast cells.

Fetal Origin of the Tumor.—In these growths newly formed villi have not yet been found—a proof of the limited power of differentiation possessed by the trophoblast cells alone when acting apart from a living ovum and without the presence of mesoderm. It may be said, therefore, that two forms of this tumor exist, the first typical, the second atypical. The former cases are so characteristic that they cannot be mistaken. The latter have been so frequently called carcinoma by eminent authorities that my belief that many of these are overlooked and incorrectly diagnosticated is certainly correct.

A study of the histology of so-called deciduomata, and a com-

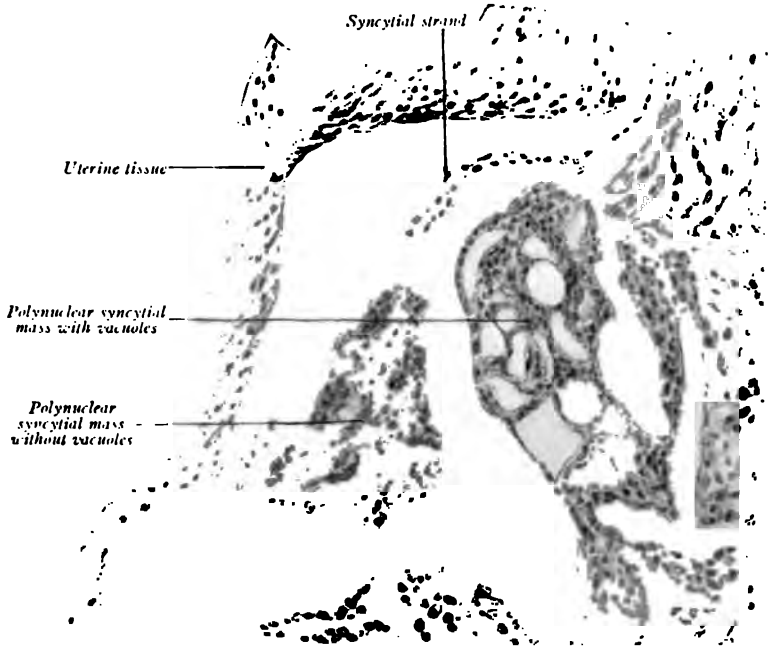

Fig. 147.—Upper left-hand corner of Fig. 146 highly magnified, showing the character of the polynuclear syncytial masses. Along the right and lower borders are larger isolated mononuclear syncytial cells.

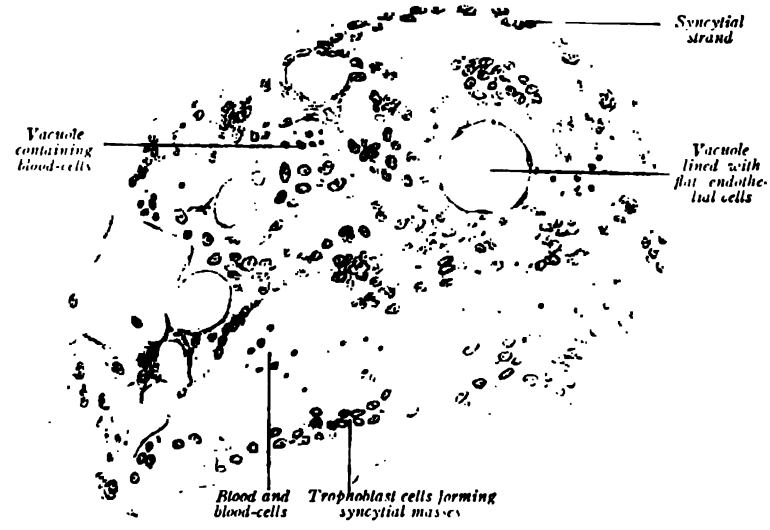

Fig. 148.—Highly magnified area of Fig. 147 showing finer characteristics of syncytial masses. Change of trophoblast cells *en masse* into polynuclear, vacuolar structures.

parison of their structure with the structure of normal placental elements, prove these tumors to be fetal in origin. The cells from which they develop are the cells which cover the chorionic villi. Since these are epithelial in character, these tumors, belonging as they do to the most malignant form, should be called chorio-epithelioma.

Characteristics of the Growth of the Tumor.—We have, then, in the chorioepithelioma a reproduction of the same constituent elements as are found in normal placentation and as are observed in benign and malignant cases of hydatid mole. These cells exert the same influence and effect on the maternal tissues as do the fetal cells in a normal uninterrupted pregnancy.

They invade, as do the normal trophoblast cells, the maternal decidua and destroy it. They infiltrate and erode the walls of the vessels. They invade and infiltrate deeply, too, the uterine wall. They advance, either as distinct Langhans or trophoblast cells, or as syncytial cells, or else they undergo in their advance a change form the former to the latter, especially when in contact with maternal blood, as in the case of placentation, either uterine or tubal.

Their invasion of the maternal vessels and capillaries gives them, from their earliest existence as malignant cells, the opportunity of invading the maternal circulation, with a resulting early formation of metastases. Their ability to erode the vessels causes profuse and constant bleeding. Their ability to destroy the maternal tissue as they advance produces larger and smaller areas of degeneration and necrosis accompanied by the presence of much fibrin. These cells preserve their ability to grow when they reach their new locations, with the result that they produce in the various organs, but most frequently in the vagina, malignant nodules of the same character as the parent growth. In fact, these secondary nodules have in some cases been observed before the character of the uterine symptoms has called attention to the presence of malignant conditions in the uterus.

The fetal cells producing a chorioma are situated in the most favorable surroundings. They have been performing practically malignant functions in that they have destroyed, even during normal placentation, maternal tissues, have invaded maternal vessels, and have been carried off into the maternal circulation.

When connected as part and parcel of an ovum, when feeding and nourishing the fetus with the products of the maternal blood which have passed through them, they are, so to speak, under control of the parent organism, the ovum; yet when released from this connection they continue an independent growth of their own. It is quite probable that in hydatid mole the edematous swelling of the chorionic stroma is due to interference with the proper exchange between the fetus and the mother, due to a more or less increased and independent growth on the part of those cells whose function it is, normally, to aid and permit of this exchange. It is likewise probable that the growth of the chorionic cells in chorioepithelioma takes place during the pregnancy and is often the cause than the result of abortion.

The Relation of Ovarian Secretion to Chorioepithelioma.— We have observed in the development and change of trophoblast cells to syncytium that the closely grouped cells, when vascularized, change to plasmodial or syncytial cells. That the blood of the mother furnishes the greater portion of the protoplasm of these syncytial cells has been clearly shown. Therefore their production and growth, even in normal conditions, depend upon their taking up directly from the mother elements essential for the formation of protoplasm, while the trophoblast cells themselves furnish the nuclei. Therefore the growth of so pathologic a tumor as a chorioepithelioma is not absolutely a reproduction of fetal cells, but is in a more or less direct manner a direct maternal production also.

The invasion and destruction of maternal tissues in normal gestation occurs within certain fixed limits, and the fetal cells entering the maternal circulation undergo no further growth. What preserves this balance? What limits and controls the potential of the parasitic fetal cells? In hydatid mole, and especially in chorioepithelioma, the fetal cells are no longer held in check, and they possess the power of unlimited growth. What has upset the normal balance?

When the fecundated ovum enters the uterus it destroys the surface epithelium under it and descends actively into the decidua. It produces a decided reaction in its immediate circumference, so that even in its earliest stages it evidences a biochemical power. When the natural blood makes its exit from the capillaries, it ought

Fig. 149.--Highly magnified area of Fig. 146 showing character of isolated mononuclear giant syncytial cells and the infiltration by them of the uterine tissue and lymph spaces.

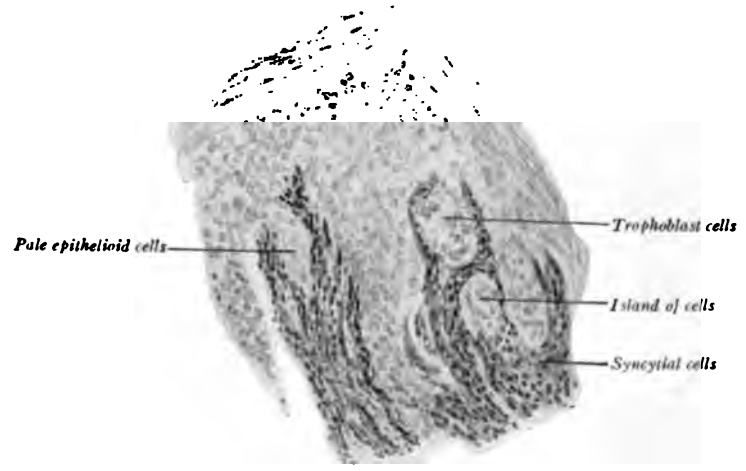

Fig. 150.—High-power drawing of atypical chorioepithelioma greatly resembling carcinoma.

to coagulate but does not. It circulates against the fetal cells which have the power to prevent coagulation. The trophoblast and syncytial cells are bathed by maternal blood and enter the circulation; therefore the ovum has a certain enzyme action, and the fetal cells may be said to furnish or represent a placental secretion.

On the other hand, the blood contains elements which exert a corrosive action on the trophoblast cells, changing them to syncytium. The resulting syncytial cells then cover the villi; they play the part of endothelium (which they then greatly resemble), and prevent the cells of Langhans and the stroma from further corrosive change by the blood. That the individual cells in chorioepithelioma have the power to grow without limit, and that the cells entering the circulation have the energy to produce malignant metastases, shows that the decidua and the blood no longer have the power to limit and control their growth.

Chorioepithelioma, occurring generally after abortion or hydatid mole, is probably the cause, rather than the result, of the abortion. Chorioepithelioma represents a more advanced stage than that of hydatid mole, but both of these conditions, in a basic way, follow the normal processes in their course and growth. The only difference is *the power of unlimited growth* possessed by the chorionic cells in these pathologic conditions. The difference in the resistance offered by the patient points to a constitutional element, *the lack of some normal secretion*, as an important factor in the etiology of chorioepithelioma.

It may be said that chorioepithelioma is due to the fact that resistance to the fetal enzymes and fetal cells offered by the blood and a secretion, probably the ovarian secretion, is insufficient to hold the growth of the fetal cells in check. Every case of hydatid mole should be followed and the possible development of chorioepithelioma should be held in mind. If, after abortion or labor, the uterus does not return to normal size, if irregular or profuse bleedings develop, the existence of a chorioepithelioma should be considered as a possibility. The scrapings after curettage make the diagnosis. To the finger, introduced into the uterus, the feel is like that of a carcinoma. This condition may develop even two to three years after labor.

Treatment of this condition consists of panhysterectomy.

FIBROMYOMATA

Myomata or fibromata or fibromyomata of the uterus, commonly called fibroids, are tumors which arise and develop interstitially in the wall of the uterus and from their subsequent situation are known as *submucous, interstitial, or subperitoneal.* From what these tumors originate is not known. It is probable that they are due to cells displaced during the fetal development of the two ducts of Müller into the genital tract and to failure of trophic control over the uterus by the ovaries.

Fibromyomata are originally multiple, but only some of them develop. Generally one develops greatly, overtops the others, and is surrounded by smaller ones. Sometimes there is a group of fair-sized tumors. All fibromyomata are originally interstitial.

Fibroids are present in many uteri, but never develop to any extent. We often see them developing in pregnancy and undergoing involution later. These are pure myomata, composed of muscle tissue, which undergo the same involution changes as the uterine muscle does after labor.

Fibroids may be very small or very large. They may enlarge the uterus so evenly that the resemblance to pregnancy is marked, or they may give it an irregular outline through multiple tumors extending into the general abdominal cavity or into the broad ligaments or into the cul-de-sac of Douglas.

They may be situated in the cervix or fundus. If situated sufficiently far down in the cervix, they may develop retroperitoneally by pushing up the peritoneum which lines the cul-de-sac of Douglas. They may be broad-based or pedicled and their connection with the uterus may be lost by thinning and absorption of the pedicle. They move with the uterus, but if pedicled they move independently. If intraligamentous or subperitoneal they are less movable. Adhesions may limit their mobility or they may be firmly incarcerated in the pelvis.

Myomata are round, but when stretched and changed by preg-

nancy they become broader and flatter. They consist of connective tissue and muscle. The more the connective tissue, the harder they are. A pure fibroma is very hard. A pure myoma is quite soft. Fibroids become harder through calcification or sclerosis of the connective tissue. They become softer in pregnancy or through fatty degeneration. They become soft and cystic or larger through gangrene, inflammatory changes, lymph-cyst changes, hemorrhage, etc.

Fibroids are by no means an obstacle to pregnancy, and their effect on the course of gestation depends upon their situation, on the amount of hemorrhage associated with them, and upon the manner of their growth, for by this latter change room for the growing ovum may be limited. A differential diagnosis between a fibroid uterus evenly enlarged and of no very firm consistence and pregnancy must often be made.

Fibroids usually increase in size in pregnancy and often diminish in size and disappear after labor, being then of the form called myoma rather than fibroma. The position of a fibroid or fibroids may interfere with or obstruct the progress of childbirth, but rarely does so absolutely. Conservative action often causes, even after many hours, a spontaneous change of position of the fibroid tumor, so that labor is ended normally. With absolute obstruction a laparotomy and Cesarean section are necessary.

Fibroids supposedly shrink or cease their growth at the menopause age, because the congestive stimulation of the ovarian secretion ceases and a state of pelvic anemia results which fails to furnish the fibroids with proper nutrition. On the other hand, they may prolong menstruation for years beyond the menopause age. They often grow rapidly at this period instead of disappearing. The most dangerous changes occur at this time just because of the lack of sufficient blood-supply, and fibroids may increase rapidly in size. They may grow rapidly by actual increase of tissue or by degeneration of their structure accompanied by necrosis, hemorrhage, etc. A fibroid may degenerate in structure in various areas, or it may even undergo purulent degeneration. Fibroids become readily infected by intrauterine examination, or if they extend through the cervix into the vagina where they come

in contact with vaginal bacteria. Fibroids may become separated from the uterus and be nourished parasitically by union with the omentum, tubes, ovaries, bladder, or intestines. Very large vessels run from these structures to the fibroid and supply it with blood. The twisting of this arteriovenous pedicle of blood-supply may cause ascites. Carcinomatous changes are very rare, but sarcomatous changes are stated, on good authority, to occur. Carcinomatous changes in a fibroid take place only when some of the epithelium which lines the uterine cavity is taken up into the structure of the fibroid by its growth, thus becoming separated from its parent endometrium.

Symptoms.—The symptoms which fibromyomata produce are increase in size of the uterus, generally with enlargement of the uterine cavity; bleeding, especially in the submucous and sometimes in the interstitial variety. They rarely produce pain, unless incarcerated beneath the promontory of the sacrum or unless the blood which is poured out coagulates quickly and is expelled from the uterus as large clots. Fibromata in their growth are surrounded by a zone rich in blood-vessels, for in fibroid itself the blood-supply is poor. Either this zone comes close to the surface of the uterine lining or else the mucosa over the fibroid is in a state of hyperplastic development, or else it is thinned out, or else the surface of the fibroid projects in broad-based or polypoid form into the cavity of the uterus. Under such circumstances bleeding, which is generally of the form of menorrhagia, may sometimes take the form of metrorrhagia. Hemorrhage is most marked in the submucous or polypoid form. In fibroids situated interstitially, and especially subperitoneally, irregular bleeding is rarely a symptom. They evidence themselves then mainly through the increased size of the uterus and through the pressure-effects on the surrounding structures, such as intestine or rectum, bladder or ureters.

In addition to hemorrhage, which may be of the form of menorrhagia or metrorrhagia, there may be pain through weight and pressure of the fibroid; there may be dysmenorrhea due to the expulsion of large clots through the cervix or there are evidences of pressure on the bladder, ureters, rectum, or sacral nerves. Incarceration within the pelvis of uterine and especially of cervical

fibroids may compress the bladder, causing great distention of that organ, with pain and constant dribbling of urine.

Diagnosis.—*An interstitial myoma or fibroma* being situated in the wall of the uterus is covered with muscle fibers. The uterus is of hard consistence. The diagnosis from chronic metritis or fibrosis is difficult if the uterus is not large. In chronic metritis the uterus is evenly enlarged, the cervix and fundus are both thickened. If a sound is passed into the uterus and the uterus is palpated through the abdomen, by manipulation of the sound the even or uneven thickening of the uterine wall may be noted. The larger the uterus and the harder the uterus, the more probable is the existence of a fibromyoma. The uterus is then enlarged, the cavity is lengthened and widened. An interstitial myoma of the cervix gives an irregular knotty wall with an even enlargement of the uterus. The diagnosis from pregnancy in the early months is often difficult, especially from pregnancy with dead fetus.

Subserous fibromyomata are not covered with much uterine tissue, but with peritoneum. They are broad-based or pedicled. They may be entirely separated from the uterus. They may grow intraligamentous and can be become separated from the uterus. If deep down in the uterus or if in the cervix, they may grow under the Douglas peritoneum, push it up, and are then retroperitoneal. A fibroid may, from such an origin, become intraligamentous. The diagnosis of subserous myomata is often difficult. We attempt to palpate the round ligaments over the tumor. A sound shows the uterus to be always enlarged, except with subserous pedicled tumors. With pedicled myomata the uterus preserves its form and we feel the knobs. With them a differential diagnosis from ovarian tumors is necessary. (See page 772.)

Submucous fibroids, whether broad-based or pedicled, grow toward the uterine cavity and are covered with mucosa. If such a fibroid grows into the uterine cavity it dilates the uterus and the cavity is lengthened and widened. It stimulates the uterus to contraction, which may cause the fibroid to protrude from the cervix as a fibrous polyp. The submucous type causes *much* bleeding. The uterus is enlarged and round, the portio is felt to pass over into the enlarged uterus. A submucous fibroid often dilates the cervix and the lower uterine segment like a balloon.

A differential diagnosis must be made from pregnancy and from metritis.

In the differential diagnosis of fibroid from pregnancy it must be remembered that in the latter there is amenorrhea, morning nausea, colostrum in the breasts. On bimanual examination the pregnant uterus undergoes in the course of a few minutes changes in consistence. Later on fetal movements can be felt and heard and the fetal heart can be heard. A still more difficult diagnosis is that of early pregnancy combined with fibroids. Amenorrhea is not always a symptom, for bleeding, which is often a symptom of fibroid, may be present. The other symptoms of pregnancy and the softer condition of the uterus are points of importance. A fibroid uterus may stimulate the breasts to secretion of milk, so that this element is not of absolute importance in a differential diagnosis.

With a living fetus the most important sign is the change of consistence which the uterus undergoes in the course of a few minutes under bimanual examination. The myomatous uterus is usually harder. In the later months the symptoms of pregnancy and the evidences of fetal movements and the beating of the fetal heart make the diagnosis.

Not infrequently a differential diagnosis must be made from retrouterine hematocele. The latter, however, becomes harder and harder after the blood has coagulated, and causes peripheral adhesions and is more closely connected with the pelvic walls. In differentiating an intraligamentous fibroid from intraligamentous hematoma it is to be noted that the latter shrinks gradually. With fibroid the uterus is enlarged, but in many cases the differential diagnosis is difficult and can only be made after continued observation. A retrouterine fibroid must be distinguished from the retroflexed fundus by rectal examination and by the use of the sound. The cervix is dilated during menstruation, and if the finger is then passed into the cervix, a foreign body is felt in the case of a *submucous fibroid*. This must be differentiated from an ovum or the retained products of an abortion. It must be remembered that an ovum or any of its retained parts may be loosened from the wall of the uterus by the examining finger, whereas a fibroid cannot. A retained placenta may be so firmly adherent as to be diagnosed as a submucous fibroid until its removal makes

the diagnosis. Mucous polyps are to be diagnosed by the fact that they are oval, lobulated, and soft, and have a thin pedicle.

Fibroids, unless they endanger the health of the patient by the amount of hemorrhage, by rapid growth, by their size, or by pressure or by degenerative changes, are not necessarily to be operated on. The fibroids which are subperitoneal with a base not too broad, as well as smaller interstitial fibroids, may be removed by myomectomy. Otherwise, if operation is necessary hysterectomy should be done. The former procedures of double ovariotomy or of tying off the vessels which supply the uterus with blood are no longer in vogue.

Fibromata are generally recognized in the thirties of a woman's life. Organic myocardial or functional cardiac changes are noted in 30 to 40 per cent. Fibroids cause changes in the liver and kidneys through loss of blood, pressure-effects, and intoxication.

Sequelæ.—Boldt says: "The close relation between myomata and cardiac degeneration has been frequently alluded to in gynecologic literature for many years, but even the very latest text-books fail to give myomata a place as etiologic factors of cardiac degeneration. Yet the circulatory symptoms frequently observed in patients having uterine fibroids suggest that there is some relation between these neoplasms and the circulatory apparatus, showing that these growths produce a detrimental effect on the circulatory system. Cardiac changes in women having fibromyomata occur too often for one to simply consider them as a mere coincidence." Of seventy-nine recent cases of fibromata, Boldt found in thirty-seven patients (nearly 47 per cent.) some circulatory disturbance. He finds five classes:

Class 1.—Dyspnea on exertion, also a small, rapid pulse with arrhythmia. There is moderate hypertrophy of the right ventricle.

Class 2.—Orthopnea and irregular and intermittent pulse; increase of dullness over the entire cardiac area; hepatic dullness slightly increased; albumin and casts in the urine.

Class 3.—An arrhythmic, hard pulse, with occasional attacks of angina pectoris. In the urine there is a trace of albumin, and there are some granular and hyaline casts.

Class 4.—A rapid pulse, from 100 to 126 beats a minute, which on sudden exertion increases from ten to twenty beats; the pulse

is small and easily compressible. The patients are easily fatigued on exertion. The urine is normal.

Class 5.—Includes the largest number. There are no symptoms referable to the heart, but the pulse is small, of low tension, occasionally irregular, from 86 to 110 beats a minute. Pain on pressure over the second sternointercostal space is noted in half the cases, associated with pain on pressure over the apex. There is a trace of albumin in the urine in some cases, associated with occasional granular and hyaline casts. There is no appreciable change in the heart area in any of these cases.

"One must regard the degenerative condition of the heart muscle as being to a large extent, if not entirely, a cause of fatal termination."

Fleck states that "myofibrosis of the heart may also occur as the cardiac lesion in connection with myomata of the uterus; further, that the lesion in connection with myomata resembles that of myocarditis, without being exactly identical with it. Brown atrophy, however, is anatomically recognized as a lesion frequently associated with myomata." In his conclusion he maintains that myomatous uteri are frequently associated with an affected heart muscle, which can be caused only by the action of poisonous substances. Myomata are invariably associated with gross anatomic changes of the ovaries, and from this source Fleck believes the poisonous products to originate.

Leopold and Ehrenfreund, in three cases of death among their last fifty-one vaginal hysterectomies, found fatty degeneration of the muscle and numerous pulmonary emboli, also thrombosis of pelvic veins and those of the lower extremity. Fatty degeneration of the kidneys was also present in one of these cases and parenchymatous nephritis in another.

Boldt says: "That a relation exists between myofibromatous tumors and degenerative changes in the heart and other circulatory changes is sufficiently accepted by competent observers to cause us to consider these tumors dangerous to life from other causes than degenerative changes in the tumors themselves. In fact, the malignant changes in these tumors do not so frequently give rise to a serious aspect as do the degenerative changes in the circulatory system."

"Women who have sustained large losses of blood frequently show symptoms of anemia, manifesting itself in cardiac palpitations, dyspnea, edema of the lower extremities, and more or less albuminuria. These symptoms often disappear on the cessation of the bleeding, but if the attacks of bleeding frequently repeat themselves, such symptoms are likely to become permanent and leave their effect on the heart muscle. That such effect on the heart is not alone caused by menorrhagia and metrorrhagia is proved by the fact that degnerative changes in this organ are also seen in patients who have not suffered such large losses of blood as the result of the tumor (in Fleck's cases, brown atrophy was especially found in the patients who had no hemorrhage), and their absence in women who have sustained large losses of blood from other causes than myomata. There is no particular form of cardiac degeneration distinctly attributable to myomata, but we know that there are various pathologic conditions of the heart, blood-vessels, and kidneys frequently associated with myofibromatous tumors of the uterus, and that the effects which frequent and profuse hemorrhages produce, manifest themselves in fatty degeneration and brown atrophy of the heart muscle. Clinical experience has taught us that patients with myomata have a weak heart, especially if the tumors have attained considerable size, and cardiac weakness may lead to *venous thrombosis*, especially in the pelvic and femoral veins, and then to pulmonary embolism. There can be no question that patients with fibroids of long standing have their resistance to anesthetics impaired, their pulse is frequent, small, and easily compressible, and sometimes irregular. They complain of inability to undergo physical exertion, tiring very soon, and often complain of *cardiac palpitation*. This lack of resistance frequently manifests itself only when an operation is undertaken for the removal of a tumor, because at that time the tax on the respective functions is at its height. If the heart affection is the primary condition and independent of the myoma, then the removal of the tumor can have no effect upon it, and the progress of the cardiac affection is not interrupted by the extirpation of the neoplasm, but the fact that has been clinically proved, that removal of such tumors has produced a beneficent effect upon the heart, shows that there is a causal connection between the conditions. We know, of course, that some

patients may have heart lesions without complaining of any symptoms referable to such lesions. Further evidence of a connection between myomata and the circulatory apparatus is found in the fact that arteriosclerosis of the ovarian vessels is frequently found, also in the pathologic changes in the constituent elements of the blood. Further, myomatous patients frequently begin to menstruate late, have profuse flow, and suffer from dysmenorrhea. The mechanical changes in the heart, like dilatation and hypertrophy, have a position subordinate to the myocardial changes."

"I have stated that cardiac degeneration favors renal changes, but, on the other hand, if a tumor presses on the ureters, renal degeneration may be produced, which, in its turn, may lead to cardiac degenerative changes.

"The changes in the blood-vessels in the immediate vicinity of a myoma have an important bearing on the occurrence of emboli, the enlargement of the veins furthering the development of thrombosis and embolism, both before and after an operation.

"It is exceedingly difficult sometimes to diagnosticate cardiac changes clinically; they may be suspected if there are present respiratory disturbances without demonstrable pulmonary lesion.

"While the size of tumors does not bear any positive relation to the degenerative changes in the heart muscle, we must admit that such changes are more likely to be present in tumors of large size, when they extend above the umbilicus, especially if hemorrhage has been a prominent symptom."

Treatment.—"The practical deduction to be made is that persons who are the subjects of myomata should be especially well fed and take sufficient exercise during the intervals of bleeding and menstruation. They should eat plenty of meat, and have such diet and exercise as will have a tendency to reduce the adipose tissue, with which they are frequently abundantly supplied, and to increase the muscular tone. Further, that such patients should be advised to have the tumors removed; cardiac and renal changes, unless hopelessly advanced, being an indication rather than a contraindication for their removal, because it also seems that patients who have myomata succumb more readily to cardiac insufficiency if attacked by an intercurrent disease. Treatment should be directed to the heart before an operation if myocarditis

symptoms are present. Intravenous infusion should be employed at the beginning of the operation if the hemoglobin is materially reduced. After the operation such patients should also receive heart treatment to act against the formation of thrombosis.

"Advice for the removal of such tumors should also be given if it is ascertained that the neoplasm has a rapid growth, or if it causes much pain or other marked symptoms. I may add that in every instance in which I have had the adnexa (tube and ovaries) and the endometrium of myomatous patients examined, and there have been more than one hundred cases, changes have been found in these structures" (Boldt).

For the treatment of the bleedings associated with fibromyomata, the reader is referred to the section on Uterine Bleedings.

INFLAMMATION OF THE FALLOPIAN TUBES

SALPINGITIS—SALPINGO-OÖPHORITIS

Salpingitis is an inflammation of part or all of the Fallopian tube. We distinguish three degrees of salpingitis: (1) A mild form, scarcely to be recognized, which involves the ciliated epithelium and to some extent the mucous membrane. (2) Involvement of the mucous membrane. (3) An interstitial form which involves also the muscular wall and which thickens the tube. The third form is generally associated with more or less adhesions, having a tendency to close the outer end of the tube. Cases beyond these grades are to be considered as hydrosalpinx or pyosalpinx. The same variations in the degrees of inflammation are to be noted in salpingitis as are observed in appendicitis. Restoration to the normal, or so nearly to the normal as to present almost no microscopic evidences, occurs in salpingitis as in appendicitis. Restoration to the normal in salpingitis, however, is a process which takes months or years, as can be readily appreciated when we consider the cocci which are so frequently present in this inflammation.

Etiology.—The elements of infection may enter the tube through the blood-channel (tuberculosis), through the abdominal cavity (tuberculosis, septic parametritis, septic peritonitis, appendicitis), or in the form of an ascending infection from the cervix, either directly through the uterus into the tubes or through the lymphatics of the broad ligaments into the tubes. While it is true that far more frequently than is recognized the exanthemata produce permanent harmful changes in the uterus, and either primary or secondary changes in the uterus and tubes, yet the causation in the majority of cases of tubal disease is to be referred to the bacteria generally found in the diseases of the urinary and genital tract.

The bacteria most frequently encountered are the tubercle bacillus, colon bacillus, streptococcus, staphylococcus, and gonococcus. Infection may occur in children, in nulliparæ, or in multi-

paræ. The seat of the primary infection is in most cases the cervix, or the cervix and uterus, extending then at various times and in various degrees of severity into one or both tubes, or first into one and then into the other, or into one tube and through the abdominal cavity into the other. The cause of salpingitis in nulliparous women may be infection without or with intrauterine manipulation. With intrauterine manipulation, in addition to infection, there may be an injury to the tube as a result of intrauterine injections, which, not rarely, find their way into the tubal lumen. The cause of salpingitis in nulliparous women without intrauterine manipulations is in most cases a latent unrecognized gonorrhea existing in the form of an endometritis.

It is first important to recognize the fact that an injury, even extensive in its nature, may be present in one tube without an apparent involvement of the tube of the other side, or else there may be an involvement of the other side of much slighter degree, or an involvement which can scarcely be recognized. This association of widely divergent degrees of inflammation may be present even with a pyosalpinx.

The etiology of salpingitis in adults, then, is as follows:

1. The diseases of childhood and gonorrhea in childhood are responsible for some instances when other later sources of infection may be positively excluded.

2. To unrecognized tuberculosis a certain number may be attributed.

3. Others may be referred to infections of a mild type after labor or abortion or curetting.

4. We must grant, however, to the gonococcus of saprophytic type the responsibility for causing the larger number.

5. An interesting point is the frequency with which lesions of the right side are more pronounced than those of the left. An explanation can be found only in the presence of the appendix, and the associated evidences of appendicitis are rather proofs of the cause than evidences of a complication. If we grant to an appendicitis, even if only catarrhal, the occurrence of some peritoneal irritation and exudation, it is only natural that the action of the tubal cilia would attract into the tubes, particularly on the right side, the infecting bacteria, generally the bacterium coli. That,

then, would explain the resulting mild adhesions, especially in instances of exclusively right-sided involvement.

Histopathology.—The inflammation of the mucous lining claims our special attention. Involvement of the tubal wall and the serous covering is not uncommon. The mucous membrane may be secondarily affected, as is the case when the infectious process makes its way from the peritoneum inward. Through resulting perisalpingitic strands there may occur torsions and displacements of the tube and ovary. The result of an inflammation of the mucous membrane is usually swelling of the folds, and hyperemia, which, if it occurs in the numerous blood-vessels of the abdominal ends of the tubes, causes serous exudation which leads to adhesions at the abdominal opening, and may result in complete closure. By the forcible stretching which the tube may undergo in the course of such a closure, the entrance to the uterus is made so narrow that even in the absence of real atresia at this point the exit of fluid is impossible.

Whatever may be the cause of such inflammation, the evidences are the same as in other organs. As a result of inflammation we find numerous round cells in the tissue, so that its normal elements are completely overwhelmed by the round cells. The result is a swelling of the folds in the tubal lining, which lie close together and easily become adherent. The epithelium of the surface is usually intact, but we see the round cells forcing their way through the epithelium at many points and lying in the canal, which is narrowed by the swelling.

The process does not usually extend deeper. Now and then we see strands of round cells following the vessels in the muscularis. As a rule, hyperemia affects the serous covering, and the peritoneum looks very red and swollen, and shows numerous signs of inflammation, leading to the formation of fine membranes. In this way long-standing inflammations lead to adhesion of the tubes to neighboring organs.

Diagnosis.—These milder forms of salpingitis are classified as salpingitis, oöphoritis, perioöphoritis, salpingo-oöphoritis, etc. The lesions of importance are the slight localized peritonitis, the oöphoritis, and the varicose condition of the broad ligaments. It is these which give the patients the annoying symptoms; it is be-

cause of these that interference is warranted. We do not refer here to large pus tubes, to large tubo-ovarian tumors; but to lesions which the examining fingers scarcely make out as tangible ones. The patients complain of pain and are primarily or secondarily sterile. Examination is generally productive of pain and often divulges the presence of a prolapsed ovary more or less fixed. To this class of patients belong the large number in whom no other than a tubal or peritoneal cause explains sterility, if examination and treatment prove all other requirements to be fulfilled. It is in this class, too, that operation, primarily for sterility, is justified. We find adhesions, thin cobweb adhesions, closing the outer end of the tube, fastening the ovary in the sac of Douglas, and preventing the entrance of an ovum into the tube. The ovaries are often of the type of small cystic degeneration. Strange to say, the degree of pain is not always in proportion to the amount or character of the adhesions, as peritoneal sensitiveness is a most varying quality and least pain is often experienced where most warranted by local changes. (See Ovarian Dysmenorrhea.)

Sequelæ of Mild Salpingitis.—The two important sequelæ of salpingitis are sterility and ectopic gestation. If both tubes are closed at their outer ends sterility is absolute. However, many cases of salpingitis are present without closure of the outer end. There is an involvement of the mucosa of the tubes, a hyperemia and a swelling of the folds, and very frequently a paraoöphoritis, complicated by a varicose condition of the veins of the broad ligament situated near the ovary, which in these cases is due to parametritis. If the involvement of the mucosa interferes with or destroys the action of the ciliated epithelium an ovum cannot enter the tube and sterility takes place. There may exist, then, cases of salpingitis without pain so long as there is no peritoneal or ovarian involvement. *These are the cases which may go on to healing and in which subsequent pregnancy may take place.* At the same time these are the very cases in which ectopic gestation may occur.

Abel, in his "Gynecological Pathology," attributes to affections of the mucous membrane the etiology of many cases of ectopic gestation.

My own views as to the causation were as follows: I believe that

in the so-called sterile period gonorrheal, puerperal, tubercular, and atrophic changes take place. The interval of years between the last labor and the ectopic gestation, the fact that the location is generally in the middle area of the tube, the occurrence of an ectopic gestation on both sides at the same time, and the frequency of external migration, together with the combination of extrauterine and intrauterine gestation, point certainly to an affection of one tube, and to involvement of lesser or greater degree of the other tube. The frequency with which, according to Küstner, a hemorrhagic tendency of the non-pregnant side occurs, as well as the microscopic discovery of catarrhal conditions, together with the history and the microscopic evidences of the presence of gonococci, point distinctly to a tubal affection. The observation of Dührssen, who found cilia abdominal to the placental site and none median to it, and Veit's observation of the presence of inflammation median to the ovum, as well as the theory of congenital and acquired atrophy of the tube, especially subsequent to labor, lead us at the present day to seek in the microscopic changes of the tubal mucosa, *i. e.*, injury to the cilia, the etiologic factor in tubal gestation. Subsequent observation has still more surely confirmed my opinion.

The purpose of quoting these observations on ectopic gestation is this: There is certainly some obstruction in the tube which prevents the ovum from entering the uterus. This obstruction is either an inactivity on the part of the ciliated epithelium as a result of inflammation, or else edema and adhesions of the tubal mucosa. The ovum is arrested in its progress toward the uterus. Such a tube, whether in an early stage of inflammation and slightly involved, or in a late stage and nearly healed, must certainly be fairly normal in its outer end to permit the ovum to be taken up into the tube at all, and yet, to the eye at least, these tubes do not appear markedly affected. As further poof, we find, in many of these cases, the other tube affected to an extent which warrants its removal. In my hands, ten non-pregnant closed tubes were also removed at operation (28 per cent.). This simply represents the same variation in the degree of severity of the affection of the two tubes as is observed in most cases of salpingitis and even of pyosalpinx.

Most cases occur in multiparæ, yet a certain proportion do occur

in nulliparæ. I consider uterine or ectopic gestation, after long periods of non-artificial sterility and after conservative operations for inflammatory conditions, in most cases an evidence that restoration to the normal has taken place in the tubes in whole or in part. I consider ectopic gestation as an evidence that either a tube is beginning to be affected at the tubal end or that it is almost restored to the normal at the abdominal end.

HYDROSALPINX

Hydrosalpinx is a cystic, elongated tumor situated lateral or posterolateral to the uterus, and which on bimanual examination becomes gradually smaller as the uterine horn is approached. Adhesions of various parts of an inflamed tube with each other have been formed, with twistings and turnings of the tubal canal in long-continued cases. As a result of the primary catarrhal inflammation there is a firm closing of the abdominal opening, because the swelling pushes the fimbriæ close to each other, causing finally a mutual adhesion. Then begins the chronic stage, for the tube, closed at both ends, gives no outlet to the secretion resulting from the inflammation, which may constantly collect in the tube and which may grow to very large size. First the mucous membrane and then the muscle becomes atrophic from the pressure of the increasing fluid, and it is on account of the presence of numerous elastic fibers in the tubal wall that such swellings can exist for a certain period without bursting. At times it happens that such tubal tumors filled with serous fluid, when they reach a decided size, empty through the uterus, only to fill again in a short time. Landau, following the etiology of the conditions observed in the kidneys, has named this condition intermittent hydrosalpinx. The fact that the contents are always serous is characteristic of this process, but rupture of vessels occasionally occurs and the serous contents are mixed with blood. Another characteristic of hydrosalpinx is that in a short time the entire tube may become affected, so that we are dealing with a large cyst, which may be fully emptied by puncture or incision at one point. Hydrosalpinx is usually one-sided, but bilateral affections are not rare.

TUBO-OVARIAN CYSTS

When the ovary is involved with a hydrosalpinx and the two are united by adhesions, there not infrequently occurs a communication between the tubal tumor and one or more cystic spaces in the ovary. This is the so-called tubo-ovarian cyst. In other cases there is no communication between the tube and the ovary, but the ovary is very much enlarged and consists of one or more large spaces resulting from inflammation of the follicles. Such tubo-ovarian cysts are situated either posterior to the broad ligament or on the floor of the pelvis or far over to the lateral wall of the pelvis, or they may extend upward into the abdominal cavity. They have a more or less tense cystic feel and the diagnosis can be made if the dilated tube can be traced up to the uterine horn. However, when situated posterior to the broad ligament its connection with the latter is often so intimate as to simulate an intraligamentous cyst. A differential diagnosis from ovarian cyst bound down by adhesions is often very difficult. The mobility of these tumors depends on their adhesion. When fixed to the floor of the pelvis they are not very movable. At times, however, especially when attached mainly to the sigmoid, they may be pushed up into the abdominal cavity as far as the mobility of the sigmoid will permit.

PYOSALPINX

Etiology.—It is not so long ago since the vast majority of cases of pyosalpinx were referred to sepsis (streptococci or staphylococci) after labor or after abortion or curetting. Though pyosalpinx certainly may be caused by other bacteria, and though at least 2 per cent. of the cases are due to the bacillus tuberculosis, it is now quite generally recognized that the majority of these cases are due to gonorrheal infection, and yet, in innumerable instances, the gonococci cannot be found. They die easily, are destroyed by their own toxins, especially if in association with other bacteria. It is recognized that the gonococci in pyosalpinx either lose their virulence or disappear after a certain period of time. Yet they have been found in the tube wall when not present in the purulent accumulation. In puerperal cases gonococci are often found in the

lochia, when not found before, and readily disappear, so far as examination by the microscope is concerned. The fact that they are not to be found is no proof of their absence.

In one hundred and seventy-nine cases of puerperal endometritis Krönig found gonococci in the lochia of fifty. According to Krönig, examination of puerperal endometritis shows the relative proportions of the various infecting bacteria to be 2 per cent. staphylococci, 27 per cent. saprophytes, 27 per cent. gonococci, and 43 per cent. streptococci. Most of the fatal cases are due to streptococci. The sequelæ, then, of puerperal inflammations can be easily understood.

When gonorrhea, originally acute, exists in nulliparæ, and is continued on into pregnancy, it is then that abortion, labor, or curettage may produce a new development which is acute in all of its manifestations, leading on to purulent accumulations in the tubes, peritoneum, or pelvic connective tissue. On the other hand these local acute conditions may be cured to all intents and purposes, and months or years afterward an extension upward may take place, which extension is not necessarily acute in its character. The bacteria may have lost their virulence, the patient's tissues have grown somewhat accustomed to the cocci, have become more or less immune, and any new involvement may take on the character and nature of a subacute inflammation. Even in puerperal women free of fever a certain, though small, percentage show in the lochia, streptococci, staphylococci, gonococci, and bacteria.

Histopathology.—There is a greater tendency for purulent inflammation to become chronic than to heal completely. Marked anatomic changes are found in cases which have come to operation after existing many years. The cause of a purulent inflammation is exclusively bacterial infection. The septic and gonorrheal forms are the most frequent. In comparison with these, infections due to other bacteria are relatively rare; among them may be considered the pneumococcus (Fränkel) and the bacterium coli. Septic inflammations are mostly puerperal, yet they may occur through infection during operations upon the uterus, or through propagation of a bacterial affection of the abdominal cavity, such as perityphlitis, etc. At times in gonorrheal affections a mixed infection may occur. The formation of pus occurs early, so that

the tubal contents consist of purulent secretion. On account of the numerous cells which this pus contains we usually are dealing with a thick, tenacious, and sometimes cheesy substance. In acute cases it is possible to distinguish the two main forms of inflammation by finding either gonococci or streptococci.

In purulent inflammation there is a marked infiltration of the mucous membrane with round cells and coexisting hyperemia of the vessels. The folds swell and become adherent or are united by the pus found between them. The cilia of the epithelia disappear, but I should like to call attention to the fact that, in spite of long-continued suppuration, the epithelium of the tubal lining is usually preserved, even on the surface, which is certainly in contact with the pus, and we find only here and there certain areas denuded of epithelium (Carl Abel).

If the acute stage has gone into a chronic one, the adhesions and unions of the folds become constantly firmer and furnish remarkable pictures, for sections of epithelial spaces result which look like glands. These pictures are naturally the more complicated and the more difficult to judge the larger the number of folds originally present, especially in the ampullar end.

In careful examination of such a specimen it may be found that the gland-like formations are always on the surface of the mucous membrane and never penetrate into the muscularis.

Chronic purulent inflammations cause entirely different conditions from the catarrhal form, for in the latter a large tube sac may be formed after a time in which the entire tube is uniformly affected; in the former this is not the rule. In purulent inflammation the tube is divided into different abscess cavities by adhesions of the various parts, so that in longitudinal section through the whole tube we see several cavities of different sizes completely separated from each other.

This is the reason why such a chronic purulent salpingitis cannot be healed by simple puncture or incision. This could only be accomplished if a single tube abscess were present, such as happens occasionally.

The stroma of the mucous membrane consists partly of round cells and partly of granulation tissue, and the vessels are increased. In the narrow spaces between the folds pus is seen, which consists

of closely gathered round cells, bacteria, and often also red blood-cells. We are dealing, therefore, with a productive inflammation.

With the exception of cilia, the epithelium remains intact in the chronic form for an astonishingly long time, and in the deeper folds even the cilia are not infrequently preserved. At times cases are observed in which large areas of the surface are robbed of their epithelium, for which process it is hard to find a plausible reason.

This happens either through mechanical pressure exerted by the accumulation of pus or through direct purulent degeneration of the tissue.

The tubal wall in chronic inflammation is almost always affected. In most cases there is hypertrophy of the wall, and we see the round-celled infiltration filling the interstices of the muscularis and also see large circumscribed groups of round cells which resemble lymphomata. The vessels, even up to the peritoneum, are often seen in sections surrounded by a thick circle of round cells.

The folds may disappear, and through purulent destruction of the wall the latter becomes decidedly thinned, and perhaps before this the existing septa between the individual sections of the tube are destroyed and there results a genuine tubal abscess after the abdominal and uterine ostia are closed.

The second result of a chronic inflammation is the formation of new connective tissue. In such a case the wall always becomes thicker and shows a firm consistence as the result of the connective tissue. The folds become atrophic, the mucous membrane has a stroma of firm connective tissue, the epithelium may disappear, and there may even result the firm closure of the tubal canal. Such a tube, even if thicker than a thumb, if no new injuries through adhesion with the abdominal organs take place, may cause the patient no annoyance (Abel).

Ovarian Abscess.—If after chronic purulent salpingitis a tubal abscess results, the pus may break through into the ovary and cause a coexisting ovarian abscess. Even though no complete abscess is present, but only isolated pus formations in the various parts of the tube, the union of both organs may lead to the penetration of pus into the ovary and the formation of an abscess. Gradually then one large abscess develops. It may happen that

the tube goes directly into a corpus luteum and then a corpus luteum abscess may be formed.

Symptoms.—Acute pyosalpingitis is either septic or gonorrheal. It is a condition which is not limited to the tube alone, but through the discharge of the inflammatory products into the peritoneum is associated with various degrees of peritonitis characterized by pain, sensitiveness, tenderness, abdominal distention, and temperature. Associated with this pyosalpingitis and peritonitis there may be involvement of the pelvic connective tissue, which is usually noted in the post-partum septic form. The gonorrheal form goes over into a subacute stage much more rapidly than the septic form.

In chronic pyosalpinx there is involvement of the peritoneum with adhesions to various of the pelvic organs. There may be anomalies of menstruation. Menstruation occurs early, is profuse, and is associated with pain. These changes are due to the involvement of the uterine lining, to involvement of the uterine wall, involvement of the vessels about the uterus. The pain is due to adhesions and is increased at menstruation. Acquired dysmenorrhea is a most important characteristic of such inflammations and is due to the changes occurring in the uterine lining and wall and in the ovaries.

Diagnosis.—The diagnosis is made by bimanual examination. The normal tube can be felt only in patients with thin abdominal walls. The milder degrees of salpingitis can be made out with difficulty. In the milder degrees of salpingitis the ovary can be made out and is often more or less fixed by slight adhesions. If fixed to the lateral pelvic wall, it often escapes detection by the examining fingers. The more infiltrated and thickened tubes, up to the varying degrees of large pyosalpinx, can be made out more readily. In pyosalpinx and tubo-ovarian tumors the ovary, as a rule, cannot be distinguished from the tube. Adhesion of the tube and ovary to the posterior wall of the broad ligament is most usual. Examination generally shows tube and ovary in pyosalpinx postero-lateral to the uterus, but they are often adherent in the cul-de-sac of Douglas. Tubo-ovarian cysts are generally situated posterior to the broad ligament, but more laterally than pyosalpinx. Tubo-ovarian cysts are often situated far over to the lateral wall of

the pelvis. When on the left side, adhesions to the sigmoid may be very marked.

Pyosalpinx must be diagnosed from ectopic gestation. In the latter at least one menstrual period was passed; there is irregular spotting or bleeding, there is often severe colicky pain. The uterus is generally, but not always, enlarged and is somewhat softer; there is pulsation in the uterine arteries. These conditions, however, may be present with involvement of the tubes, especially in the early stages. Gonococci and evidences of gonorrhea should then be looked for.

In early salpingitis the uterus may be enlarged, through inflammation, there may be irregularities of menstruation, there is usually pulsation in the uterine vessels and a sausage-shaped tumor is felt, all of which renders the differential diagnosis from ectopic gestation difficult. Salpingitis is frequently double-sided and there is a leukocytosis. Temperature is present with acute salpingitis, but this is often noted with ectopic gestation associated with internal bleeding and absorption of the fibrin elements of the blood. Rectal examination is of great aid in determining the feel and character of the tube. As a rule, however, a pregnant tube is the softer. Gonococci and evidences of vulvar and cervical gonorrhea should be looked for.

In distinguishing pyosalpinx from a small myoma the history is of greatest importance. Either a history of post-partum infection is present or else corroborative evidences of a gonorrheal infection are to be looked for.

Differential diagnosis sometimes has to be made between pyosalpinx and hematocele. It must be stated that in the latter the tube and ovary, as a rule, are situated in front and to the side of the mass which fills up the cul-de-sac of Douglas.

TUBERCULAR SALPINGITIS

Tuberculosis of the tubes is a frequent condition. It is usually a secondary change due to the presence of the bacilli in the peritoneal cavity which are taken up by the ciliated epithelium of the tubes, and, therefore, affect the tubal mucosa. Many cases present the picture of catarrhal salpingitis and the diagnosis is only

established by examination of sections. It is probably often present in early or even advanced cases of tubal involvement, even when macroscopic examination shows no alteration of tuberculous nature. A change considered typical of tuberculosis is a small or multiple nodular thickening of the tube, the so-called salpingitis isthmica nodosa. The tube is firm and hard. In more advanced cases the tube ends are closed by adhesions and the tube is enlarged and contains a creamy purulent or cheesy material and tubercles. In still more advanced cases the tube gives the picture of a pyosalpinx. There is often in the major forms, involvements of the peritoneum and ovaries with adhesions and ovarian abscess. When the tubes and uterus are studded with miliary tubercles or when a tuberculous peritonitis is present, the diagnosis is readily made at operation.

On bimanual examination the condition found is either that of salpingitis or of pyosalpinx. When tuberculous peritonitis exists with ascites, and if temperature and tuberculosis of the lungs are noted, a probable diagnosis may be made. In cases without temperature the injection of tuberculin with a resulting temperature reaction speaks for the specific tubercular nature of the tubal involvement, but this reaction may be caused by a tubercular focus elsewhere.

Treatment.—Unless a rapidly growing thin-walled pus sac or an ovarian abscess or a purulent exudate in the sac of Douglas renders vaginal incision and drainage necessary, the acute cases are treated as described under Perimetritis (pp. 631, 632, 633) and under Gonorrheal Involvement of the Tubes, Ovaries, and Peritoneum (pp. 516, 517, 518). After the acute stage, if pyosalpinx results, treatment for several months, but without intrauterine manipulations, as given under Chronic Metritis (pp. 617, 618, 619), should be carried out. Then the bacteria or cocci in the tubes either disappear or lose their virulence and operation, if necessary because of pain, is of little danger and post-operative stump-exudates (recrudescences of the associated cellulitis of the broad ligaments) are avoided. Tuberculous pyosalpinx, contrary to usual opinion, injures the general health of the patients the least of all tuberculous involvements (Geo. Gray Ward). After operation they improve remarkably. If hydrosalpinx or tubo-ovarian cysts cause pain,

operation is indicated. The mild forms of salpingitis and the cases of salpingitis diagnosed by exclusion as the cause of sterility and salpingitis of the non-pregnant tube in ectopic gestation demand the treatment given under Chronic Metritis (pp. 617, 618, 619), but without any intrauterine manipulation of any sort. With such cases, and with cases in which operation is performed to remove the adnexa of one side only, *curettage should never be done.* It makes the unrecognized salpingitis of the other side worse, or starts it up if not present, it sends infection out into the broad ligaments, causes varicocele of the broad ligaments and ovarian dysmenorrhea. It does this with a minimum of early annoyance, but with a maximum of eventual harm. After operation on the adnexa of one side, the patient should stay in bed for four weeks to diminish the tendency to extension to the other side.

ECTOPIC GESTATION

Etiology.—In former years our views concerning the origin of ectopic gestation depended mainly on the discovery of pathologic conditions macroscopically evident. Cases were reported with fibroma of the isthmus tubæ or with polyps at the uterine end of the tube. The growth of the ovum in a tubal diverticulum or in an accessory tube was considered to furnish a satisfactory explanation. In some cases the pressure of ovarian or abdominal tumors was supposed to obstruct the onward movement of the ovum. Abel and Freund found in a twisting of the tube and in a failure of development a satisfactory theory for the frequent occurrence of ectopic gestation. Since, in a majority of the cases, peritoneal adhesions are present, these were and even yet are considered to so alter the course of the tube's lumen as to prevent the entrance of the ovum into the uterus. Therefore, visible inflammations were considered to be an important etiologic element.

The experiments of Leopold have shown that the ovum given off by one ovary may enter the tube of the other side. The cases are not so rare in which the tube of one side was closed or absent, and although the corpus luteum verum was found in the ovary of the same side, yet an ovum had entered the uterus. Schröder, Koblanck, and others have found a pregnancy in a rudimentary horn between which and the uterus no epithelial connection existed. Many years ago Manierre collected thirty-nine cases of pregnancy in rudimentary horns. The same is true of those cases in which the corpus luteum verum is on one side and the ovum has developed in the horn of a uterus unicornis of the opposite side. Küstner removed a right-sided extrauterine gestation tube and a left-sided ovarian cyst. Shortly afterward a uterine pregnancy took place.

Such an *external migration* occurs frequently in tubal gestation; although Küstner took note of the frequency of this event in only the last twenty-five of a series of one hundred cases, it proved to have

taken place in seven. Prochownik found that external migration had taken place in one case of eight which he had examined closely. Martin found the corpus luteum on the same side as the tubal gestation in thirty-seven cases, on the opposite side in four, and uncertain in thirty-six.

External migration of the ovum has been viewed by Sippel and others as the etiologic factor in ectopic gestation. They believe that the ovum after its migration becomes too large to permit of its passage through the tube lumen. The examinations of Peters, and especially of v. Spee, however, show conclusively that no chorionic villi are present until the ovum has been nourished for a considerable time by the decidua in which it is embedded. In addition, the Graafian follicle is in the majority of instances found in the ovary of the affected side, so that such an etiology would explain only the smaller number of cases.

This migration, however, calls our attention to the presence of a pathologic condition in the mucous membrane of the opposite non-pregnant tube. While it calls our attention to the fact that the non-pregnant tube is often affected, it only proves that it is more affected than the tube in which the ovum is finally embedded, for some cilia must be present in the latter to influence the external migration of the ovum. Various experiments make it seem probable that in the perfectly normal tube no ovum can develop.

In considering the history of those cases which have been closely noted it is found that ectopic gestation occurs most frequently in multiparæ and that a sterile period of varying length precedes this pathologic development. Martin found that sixty-five multiparæ were affected as compared with twenty nulliparæ. In a series of one hundred cases of Küstner's only ten ectopic gestations occurred in nulliparæ; the other eighty-seven had borne children and three had aborted. In twenty-four cases it occurred five or more years after the last labor; in fifty-five cases, from one to five years; and in eight, in less than twelve months. Veit found that in fifty-two cases of repeated ectopic gestation a sterile period of two to eleven years preceded the first ectopic gestation. Between the two events was a period of six weeks to six years. The primary sterile period represents the time in which inflammatory changes in the mucosa may occur, either *gonorrheal*, septic, or tuberculous.

These changes naturally involve the uterine end of the tube more than the abdominal, and in the subsequent course of events, when healing does result the uterine end improves slowly.

Franz makes inflammatory changes in the tubes responsible for the occurrence of ectopic gestation. This is the more probable since inflammatory processes are so frequently found in the other tube. Franz found such changes in 80 per cent. of those cases in which a sterile period of two to seventeen years was noted. In cases where a sterile period of less than two years was observed, tubal changes of the other side were present in only 53 per cent. He comes to the conclusion that we must seek the etiology in those affections of the tubes which have run their course, and which, having for a long time prevented the moving of the ovum, have permitted a gradual and partial restoration to normal conditions.

While in a certain number of cases no pathologic microscopic changes are found in the tubal mucosa, it may be explained by the fact that so-called catarrhal conditions frequently show little microscopic change. Even during or after gonorrhea the tube may seem, macroscopically, fairly normal. Ahlfeld, in an experience of many years at the University of Marburg, met with so few cases of tubal gestation that he considers the relative freedom of his patients from gonorrhea, as compared with those in the larger cities, to be the only explanation.

Various inflammatory influences are etiologic factors in that they destroy the cilia in whole or in part, or diminish their functional activity.

Naturally, there must be activity to a certain extent on the part of the cilia at the abdominal end of the tubes, or the ovum would not be drawn into the tube at all. The fecundated ovum is drawn up into the tube, is carried along to a point where the cilia no longer functionate, stops there and an ectopic gestation has begun.

Recurrences of tubal gestation take place but rarely in the same tube. Patellani, in a tabulation of thirty-six cases, found that first one tube and then the other was the seat of ectopic development. Veit, among fifty-two reported cases, found that it recurred only three times on the same side. An additional point of importance is the occurrence of tubal gestation in either tube at the same

time, of which Gebhard mentions nine cases. Further, Patellani has collected thirty-seven instances of combined uterine and extrauterine gestation—a practical proof of an affection of one tube, and certainly excluding external migration as the cause.

I believe that in the so-called sterile period gonorrheal, puerperal, or tuberculous changes take place. The interval of years between the last labor and the ectopic gestation, the fact that the location is generally in the middle area of the tube, the fact that repeated ectopic gestations are observed, the occurrence of an ectopic gestation on both sides at the same time, and the frequency of external migration, together with the combination of extrauterine and intrauterine gestation, point certainly to an affection of one tube, and an affection of different degree of the other tube. The frequency with which marked inflammation of the non-pregnant tube is noted, as well as the microscopic discovery of catarrhal conditions, together with the history and the microscopic evidences of the presence of gonococci in many cases, point distinctly to a tubal affection. The observation of Dührssen, who found cilia abdominal to the placental site and none median to it, and Veit's observation of the presence of inflammation median to the ovum, lead us at the present day to seek in the microscopic changes of the tubal mucosa, *i. e.*, injury to the cilia, the etiologic factor in tubal gestation.

The tendency is increasing to consider inflammatory changes as the cause of ectopic gestation. Some, however, say that the ovum has in some instances a well developed outer cell growth when it enters the tube, and that this causes its settling in the tube. Others consider a perisalpingitis subsequent to appendicitis as the responsible factor. Many claim that the cause is not known.

Philander Harris agrees with my view. "All who are experienced in suprapubic sections for pelvic disease will surely agree in the assertion that a very considerable percentage of women who have tubal pregnancy are found, when operated on, to have diseased tubes. Thus it must be apparent that in a certain percentage of the cases of ectopic gestation there are two symptoms producing factors, namely, salpingitis and pregnancy within a tube. Not very gross pathologic changes, coming from salpingitis, constitute the chief if not the only cause of ectopic gestation."

"It is the existence of salpingitis, the great sterilizing disease of women, which accounts for the fact that periods of sterility, varying from three to fifteen years or more, so commonly precede the occurrence of tubal gestation. A previous attack of salpingitis not only causes the sterility, but also renders the tube incapable of conveying the fecundated ovum to the uterus."

Histopathology.—The lining of the tube is composed of folds of mucosa. An ovum may begin its development situated on the surface of the mucosa folds, forming the *columnar* type of tubal gestation. An ovum may begin its development down deep among the folds of mucosa, forming the *intercolumnar* type. An ovum may settle on the tubal wall and sink deeply into the wall of the tube. Its chief placental growth at this point results in penetration of the wall by villi. This is the *centrifugal* type of development.

In the *columnar type of development* the ovum is surrounded by mucosa folds only. Such a columnar situation makes abortion easy and of little danger. Very soon after the entrance of the ovum tubal bleeding may result; the ovum dies and further hemorrhage expels it. The tube may return to a normal state, without any evidences of the previous condition, or else a hematosalpinx may be formed if the abdominal end of the tube is closed. The ovum may, theoretically, develop to a much further degree and press the folds against the tubal wall. If development continues, the villi may extend into it, but the connection of the ovum and the villi with the surrounding tissue is a loose one.

In the *intercolumnar* form the ovum may rest on the wall of the tube. Any tubal fold beneath it will be compressed, but epithelium may be present in a depression. Other folds may form a capsularis or reflexa. The villi at the placental site enter into the wall; here a hemorrhage may result through this invasion of the wall and of the vessels, and through the invasion of the capsularis by fetal cells; or the capsularis may rupture. If it be torn, or if it be not closely adherent, the intervillous space is opened. Abortion, complete or incomplete, usually incomplete, is the general rule, but rupture might occur. If the abdominal end be closed, a hematosalpinx or a tubal mole may represent the final outcome.

In the *centrifugal* form the ovum sinks into the wall of the tube

and an invasion of the wall and vessels by the villi may take place, even up to the serosa. The capsularis is formed by muscularis and mucosa. It may rupture at its summit. The villi which extend up to the serosa may cause bleeding, though their penetration is so gradual that these points are usually covered by thrombi. Finally a rupture may take place at the placental site through perforations, producing an arrosion. The ovum practically eats up the wall. Even though the tubal diameter be large enough to give sufficient room, this occurs. It is not the result of pressure, as may be seen in gestation at the fimbrian end, where rupture also can result. Villi which perforate the serosa may cause a very decided hemorrhage into the peritoneal cavity. When no rupture has occurred and the abdominal end of the tube is closed, only the microscope may divulge the source of such an intraperitoneal bleeding. Such minute perforations may cause collapse through hemorrhage, even though the opening be no larger than the head of a pin. Even after the death of the ovum the villi can grow, and an active tubal mole is found with continued bleeding. If villi do not grow, hemorrhage continues, since no contraction can take place as is the case in the uterus. The centrifugal form furnishes the majority of tubal ruptures. But the vast majority of these so-called tubal ruptures are either arrosions or are due to arrosion by the perforating villi.

The Further Course of Ectopic Gestation.—The theory that the tube ruptures because the ovum is too big is, as a rule, wrong for cases in the first three months. The various interruptions of ectopic gestation are all the result of hemorrhages primarily minute. The usual ending, clinically, of the gestation begins with bleeding in the tube. The invasion of the vessels of the mucosa and the tube wall and the invasion of the serosa furnish the causes for hemorrhages. The death of the fetus, as in the case of the uterus, brings about changes which result in bleeding. The primary cause is a lack of decidua. In a mucosa previously affected, when many large vessels are changed by the fetal cells and invaded by villi, an increase in tension through contractions of the tube walls furnishes an easy explanation of this hemorrhage. In the uterus the vessels are firmly embedded in the thick decidua and take a twisted course; in the tube the vessels are straight and embedded

in loose connective or fetal tissue. Bleeding on the part of the capsule is possible and is of frequent occurrence, since it does not undergo decidual change and may be invaded by fetal cells. The contraction of the muscle fibers on either side of the capsularis renders the rupture of this pseudo-reflexa easy because of the absence of decidual changes, and the point of rupture is usually at the summit of the capsularis. If the capsularis or reflexa be composed of muscularis and mucosa, a decided bleeding may result if only the summit of the capsularis be torn.

Rupture of the tube almost always takes place at the placental site, which is the seat of old and new hemorrhages. The hemorrhage and loosening of the ovum which represent the clinical ending of these cases is not the first bleeding, for older ones are usually present. The various processes depend upon the ovum, the condition of the tube before pregnancy, the character of the union of the ovum with the tube, the place of union, and trauma. The reaction of the tube is limited to the area of the ovum; and in this we find the main difference between tubal and uterine gestation. The uterus undergoes early independent growth; the tube does not. With the development of the ovum the uterus grows step by step, while in the tube the ovum makes room for itself and obtains its nourishment by the invasion of the tube walls. It may stretch the circumference of the tube so that its wall may be reduced to a layer of connective tissue so thin that rupture may result at any point.

Ampullar cases usually end in abortion, generally with hematocele. There is no obstruction, unless decided adhesions are present, and the blood is generally poured out quickly into the pelvic peritoneum or into the sac of Douglas. Such an abortion may be complete or incomplete. Rupture occurs in this situation very rarely. The majority of tubal gestations are situated nearer the isthmus tubæ. In these cases we have: (1) Abortion without rupture, complete or incomplete, with bleeding from the abdominal end of the tube. Generally a hematocele is found at the abdominal end. The tubes are often so curved that it is difficult for the blood to make its way to the fimbriæ, and the oozing is of a slow character. The blood extends rarely more than a very short distance toward the uterine end, because of the numerous short curves present

here. (2) We may have single or multiple microscopic perforation of the tube wall by villi, causing even decided hemorrhage without apparent cause. (3) We may have macroscopic perforations or "arrosions" of the tube wall, covered or not covered by thrombi, and causing great hemorrhage. (4) We may have a rupture either into the free abdominal cavity with no hematocele at the abdominal end of the tube, or with partial encapsulation, in which event there may be hematocele at the abdominal end if the tube is open. (5) We may have an intraligamentous tear with hematocele at the abdominal end. In these latter cases the placental site is always on the inferior surface of the tube and the ovum has descended centrifugally to the vessels of the ligamentum latum. These and the interstitial forms are the most difficult cases, and may require hysterectomy to remove the mass in toto.

We must not overlook the decided danger from continued bleedings involved in tubal abortion. The general view is that tubal rupture gives much more pronounced symptoms and a much more decided hemorrhage than tubal abortion. When we consider that incomplete abortion means that villi are left in the tubal wall, and that so-called complete tubal abortion means the retention of trophoblast cells, we may readily understand that bleeding may continue for an indefinitely long period. It is a fact, too, that even complete abortion may cause decided symptoms. Mandl reports two cases from the clinic of Schauta, accompanied by pronounced collapse and decided hemorrhage. In the first case no villi were found in the tube wall. In the second case, although villi were found in the blood-clot in the tube, none were found in the tube wall. Like cases of tubal abortion, with symptoms as severe as are frequently the rule with tubal rupture, have been reported by Klein, Zedel, Piering, and others. It seems to me that pathologic and clinical evidences are of sufficient weight to destroy the view, prevailing in many minds, that tubal rupture should be treated by extirpation of the tube, and that tubal abortion demands only conservative treatment. The proportion of tubal abortion to tubal rupture is probably 8 to 1. In this connection it is quite sufficient to mention the dangers arising from hematocele. The injury to the peritoneum, the adhesions which take place, and, above all, the by no means infrequent occurrences of

subsequent purulent degeneration of such an accumulation of blood, are only some of the injurious results avoided by prompt removal.

The possibilities are represented by the processes of abortion, microscopic perforation, macroscopic perforation, rupture, hematosalpinx, and tubal mole. In ninety-nine cases of interrupted tubal gestation in the clinic of Schauta, a hematocele was found sixty times—fifty-five after abortion, five times after rupture. If the bleeding be very slow, the blood forms a capsule, due to peritoneal adhesions, into which the subsequent hemorrhages enter, the so-called secondary hematocele. If adhesions are present at the abdominal end of the tube, they form a portion of the capsule. The hematocele resulting after rapid bleeding furnishes the primary or diffuse form. The secondary hematocele occurs much more frequently than the primary. In the sixty hematoceles found among ninety-nine cases in the clinic of Schauta, only four were diffuse. Of the tubal abortions found in the same clinic, seventy-five were incomplete and six were complete.

Symptoms.—In ectopic gestation the breasts rarely show the same evidences as in intrauterine gestation. There may be pulsation of the uterine arteries, but this is also present in intrauterine pregnancy and in other conditions, especially inflammatory. The passing of a decidua accompanied by bleeding occurs with tubal hemorrhage, tubal abortion, or tubal rupture, but here intrauterine abortion and dysmenorrhea membranacea must be excluded. It is always most important to ask about the occurrence, non-occurrence, or character of the last expected or skipped menstruation. There may have been relative amenorrhea or absolute amenorrhea, which latter is generally the case even if it lasts only for ten days or two weeks. Sometimes no change in menstruation has been observed. Uterine bleedings generally speak for disturbances in the tube, such as death of the embryo, hemorrhage, tubal abortion, or tubal rupture. These bleedings are usually followed by peritoneal irritation and by tubal and uterine colic. These sudden pains are not always felt in the pelvis, but sometimes higher up, even in the region of the liver. Combined with these symptoms there is often nausea, pallor, dizziness, or fainting. The uterine bleeding may continue irregularly for days or weeks, often

with the above colicky pains, but the bleeding is not extremely profuse, clots are rarely expelled, and the blood is often brown and mixed with mucus.

In contradistinction to intrauterine abortion it is noted that the cervix is not dilated. Examination of expelled structures shows no embryo, no fetal membranes, no chorionic villi. When decidua is expelled, microscopic examination may aid in the diagnosis. The decidua cells in ectopic gestation are not so large as in intrauterine pregnancy. The cells are not mutually flattened and no chorionic villi are found. The microscope can make a positive distinction in favor of uterine pregnancy only by the finding of chorionic villi.

Ectopic gestation may be diagnosed before bleeding, abortion, or rupture take place in the tube, or after one of these conditions has taken place. In the first instance bimanual examination finds a round or sausage-shaped dilatation of the tube which is soft, elastic and sensitive, and not so tense as ovarian tumors. This mass is movable unless adhesions are present. It resembles adnexal tumors, and a differential diagnosis is especially difficult from an intrauterine gestation combined with an adnexal tumor.

In the second instance bleeding may take place into the tube, which then feels firm, hard, and movable, or into the cul-de-sac of Douglas, or if the bleeding occurs slowly and the blood coagulates it may accumulate about the tube. Bleeding in the tube or tubal abortion or tubal rupture produce peritoneal irritation. There is then a history of amenorrhea and of irregular menstruation or of irregular spotting or oozing. The decidua, if expelled, is generally cast off after tubal abortion or rupture has taken place. Examination may show a soft resistance in the cul-de-sac of Douglas if there is free bleeding, or increased resistance about the adnexa if the bleeding is slow and encapsulated.

If blood is accumulated in the cul-de-sac of Douglas, such a fresh hematocele is soft and cystic, but later on becomes hard. It is to be diagnosed from a retroflexion of the gravid uterus. A hematocele pushes the uterus forward. As Winter says, the whole of the uterus is in front of the tumor, whereas in retroflexion of a gravid uterus only the cervix is in front. In retroflexion of the gravid uterus the connection between the cervix and the

soft, pregnant, retroflexed fundus in the cul-de-sac of Douglas is not made out, and the cervix is mistaken for the uterus and the retroflexed fundus is mistaken for a hematocele.

A *peritubal hematocele* is situated generally postero-lateral to the uterus, is of irregular outline, soft in the earlier stages, and later on harder and firm and may be so large as to extend above the umbilicus.

Intraligamentous hematocele has probably no other cause than the rupture into the broad ligament of a tubal pregnancy. With marked bleeding into the peritoneal cavity of a rapid nature the symptoms are those of internal hemorrhage and constitute the tragic form of this condition.

The Early Diagnosis of Ectopic Gestation.—Because of our complete accord on this important topic, I quote in the remainder of this section the views of Philander Harris: "There are instances in which the first complaint of the patient, and the first symptoms, are of such nature as to excite the greatest alarm in the minds of physician and friends of the patient, because the patient is, without previous warning, brought at once to the verge of death; yet such cases are very exceptional. Such symptoms occurring progressively or suddenly are called the tragic symptoms of ectopic gestation.

"Twenty-nine out of every thirty cases of ectopic gestation present symptoms by which a presumptive, if not a reasonably certain, diagnosis may be made prior to the patient's arrival at a condition which is alarming. Most cases present a group of symptoms preceding the tragic stage of the disease sufficiently distinctive to warrant a diagnosis, and since these symptoms are in no way alarming, they are called the non-tragic symptoms of ectopic gestation." Based on an experience of over one hundred cases, Harris came to the following conclusions:

(*a*) More than 90 per cent. consulted a physician on account of symptoms referable to the pelvis before the tragic stage was reached.

(*b*) Many of them received medical advice or attendance for a term of several weeks before tragic symptoms presented.

(*c*) Many such cases are not diagnosed, and although the patients continue to exemplify the symptoms of the non-

tragic stage of ectopic gestation, they rely for days or weeks upon false hopes until the tragic symptoms occur.

(*d*) Of the 90 per cent. who consulted a physician a very large proportion were told that an (ordinary) abortion was threatened, was recurring, or had occurred.

(*e*) Of the 90 per cent. who consulted a physician, about 20 per cent. were subjected to the operation of curettment for the cure of metrorrhagia, the real cause of the metrorrhagia not having been suspected.

(*f*) Of the 90 per cent. who consulted a physician, some were unable to pursue their usual vocation, being confined to the bed or couch for days or even weeks before tragic symptoms occurred. Except for brief intervals of an hour, or a few hours or so, *a large proportion of the cases of ectopic gestation pursued their usual vocation during the non-tragic stage* without material or prolonged interruptions.

"*When any woman after puberty and before menopause who has menstruated regularly and painlessly, goes four, five, six, eight, ten, fifteen to eighteen days over the time at which menstruation is due, sees blood from the vagina differing in quality, color, quantity, or continuance from her usual menstrual flow, and has pains, generally severe, in one side of the pelvis or the other, or possibly in the hypogastric region, ectopic gestation may be presumed.*"

The two symptoms of greatest value are:

(*a*) Atypical menstruation, or metrorrhagia.

(*b*) Pains.

The expression "atypical menstruation of ectopic gestation" directs attention to the appearance of blood generally out of rhythm with the normal menstrual cycle of the individual. The amount of blood lost may be very much greater, or very much less, than the usual menstrual flow of the patient. It may be continuous or appear with interruptions. It may be darker or may be lighter or more brownish than the usual menstruation.

The metrorrhagic blood of ectopic gestation very often has a sort of slippery character, almost sufficient at times to diagnosticate ectopic gestation by the effect of such discharge upon the tactile sense.

History.—1. Note if the patient's present or last menstruation was out of type.

2. Note the date, duration, amount, and character of the menstruation preceding the atypical menstruation, and of the menstruation before that one too.

3. Note the date of each colic or series of colics, and the date or dates of any recurrence.

If the patient has been accustomed to painful menstruation, analyze the character of her dysmenorrhea, and ask her particularly if the pains which appeared in connection with the blood at this time were the same as the usual pains of her dysmenorrhea. If the patient is intelligent, she will at once say that she never had pains like these, and she will at once tell you wherein the pains and the flow of her present attack differ from her previous and painful menstruations. Morning sickness and enlargement of the breasts, which are the ordinary symptoms of intrauterine pregnancy, do not belong to the symptomatology of the extrauterine pregnancy. If, with a diagnosis of miscarriage, the patient is still bleeding and has pains, be slow to accept such a diagnosis, unless a fetus has actually been seen by some one.

If the colics are very severe with steady pains between them, the abdominal walls may be rigid. The colics in the beginning of tubal pregnancy are often mistaken for intestinal pains. They may not cause the patient to rest more than momentarily from her work or pleasure. In other cases the pains are so severe and agonizing that the doctor is at once sent for, whatever the time of day or night. Soreness of the abdomen may pass off in an hour or less after a severe ectopic gestation colic, or it may be so prolonged as to prevent the patient from walking for a day or two, or longer. Occasionally jars of the body in walking, or being much upon the feet, cause so much pain that the patient remains in bed for a while. In such cases the colics may return after shorter or longer intervals.

Sometimes colics and the atypical menstruation of ectopic gestation appear before the menstruation is due, or just at the time that it is due. Such a history is rather unusual, and in the absence of tragic symptoms, such as a rapid and weak pulse, fainting, and pallor of the skin, may offer very little presumption of the true

condition present until we have waited a sufficient time to find whether the menstruation is of the usual type for that individual.

Colics and the sharp pains of ectopic gestation are generally closely attended by the appearance of a bloody discharge from the vagina.

The Non-tragic Stage.—In this stage of ectopic gestation the pulse usually remains about normal. If, however, within a few hours a sufficient quantity of blood is lost in the abdomen, the pulse will be found quickened, the patient weakened, and the temperature below normal, and the amount of blood thus lost to the circulation may be sufficient to at once cause alarm or imperil life. If so, the tragic stage has been reached.

The temperature of the patient in the non-tragic stage of the disease, like the pulse, is not materially affected, unless a considerable amount of blood has escaped into the peritoneal cavity. In that event there sometimes occurs, a few days after extensive bleeding in the peritoneal cavity, some elevation in temperature, generally not more than a degree or so. It should be said that the symptoms of the non-tragic stage may be present for days or weeks before any considerable amount of blood is found in the abdominal cavity. During all this time the temperature may not be materially altered from the normal.

The Tragic Stage.—The tragic stage of the disease is exemplified by severe colics, pallor of the skin, weak and rapid pulse, a fall of temperature one, two, or three degrees below normal, rapid breathing, fainting, generally vomiting and restlessness, and sometimes a lethargic condition from which the patient may be aroused. In this tragic stage the pulse may be anywhere from 120 to 180. It may not be possible to count it at the wrist, although its flickering may be perceived until shortly before death.

Physical Examination.—No disease produces in the pelvis such a variety of conditions to be palpated by examining fingers and hands as does ectopic gestation. Ectopic gestation always increases, in a slight degree at least, the size of the uterus. It is exceptional for the uterus to become very much enlarged. The cervix is generally not altered by tubal pregnancy, but this rule has some exceptions. Most uteri of ectopic gestation are not very materially altered in size, shape or consistency, from the non-pregnant condition. Unless hematocele has formed, the mobility

of the uterus may not be particularly affected. If the uterus is lifted by the examining finger, pain is almost always produced on the side of the pregnant tube.

In the non-tragic stage the pregnant tube is usually sufficiently large to be palpated, and possibly also approximately measured by bimanual palpation. Operation in the non-tragic stage of the disease may show the tube at its largest diameter to not exceed one-half of an inch. The tube may so enlarge from the growth of the fetus within it, and from hemorrhage between the fetal membranes and the tube wall, as to increase its diameter to two inches or more. The tube may become distended from hemorrhage within it, without any considerable amount of blood reaching the peritoneal cavity, and the patient had consequently not yet exemplified the symptoms which characterized the tragic stage of the disease.

A pregnant tube is always tender when squeezed, and may be extremely painful when so treated. The tube may be embedded in blood-clots, or so displaced, or partly or completely engulfed in hematocele, that its form and size are indistinguishable.

If a large hematocele has formed, the uterus may be carried far upward and almost out of the pelvis. When thus lifted it is generally pushed to the opposite side from that in which the tubal pregnancy exists. The hematocele may be so large and the uterus so far pushed up that the cervix will with difficulty be reached by the index-finger per vaginam.

The corpus and fundus uteri resting on the outer and anterior surface of a large hematocele may be distinctly palpated through the abdominal wall. In one instance the uterus was visible as it rested upon a large hematocele and lifted the abdominal wall.

Differential Diagnosis.—The following are some of the conditions from which tubal pregnancy must be differentiated:

(*a*) Uterine abortion. (See pp. 675, 752.)

(*b*) Salpingitis.

(*c*) Uterine polypus and submucous and interstitial fibroid of the uterus.

(*d*) Cancer of the uterus.

(*e*) Ovarian cyst with twisted pedicle.

(*f*) Progressive intrauterine pregnancy accompanied by metrorrhagia.

Salpingitis.—A quite common result of salpingitis is shortening of the intermenstrual term and a lengthening of the menstrual flow, with increase in the quantity of blood lost at menstruation.

It is not at all unusual for a patient with acute salpingitis to have a lengthened term of menstruation, and to have it followed for a number of days with a metrorrhagia. If by the time we first see such a case the initial fever of her infection has passed away, and we then find her temperature normal, we may wrongly conclude that her symptoms are those of the non-tragic stage of tubal pregnancy.

If the salpingitis has existed for months or years, the patient may have suffered from pelvic pains, and such a history will of course place us upon our guard, for she may present the symptoms of salpingitis, to which, in consequence of ectopic gestation, are added the symptoms of the latter condition, or she may have only the former disease.

The patient with chronic salpingitis rarely goes over her time of menstruation. If there is any change in the length of time from beginning to beginning of menstruation, it is more likely to be shortened, while the duration and amount of the flow are increased.

Salpingitis disposes many women to menstruate ahead of time; ectopic gestation apparently delays the last or alleged menstruation, and when it appears it differs in one or several particulars from the previous menstruation of the individual.

A very considerable percentage of women who have tubal pregnancy are found, when operated upon, to have diseased tubes. Therefore, in a certain percentage of the cases of ectopic gestation there are two symptom-producing factors, namely, salpingitis and pregnancy within a tube.

I believe that not very gross pathologic changes accruing from salpingitis constitute the chief, if not the only, cause of ectopic gestation. If this be true, then a certain percentage of cases of tubal pregnancy will exhibit to a certain extent the symptoms of salpingitis together with the symptoms of pregnancy within the tube.

The failure to always differentiate tubal pregnancy and salpingitis is of little consequence, for the reason that in either case an operation is undertaken in the interest of the patient, and while the abdomen is opened the pathologic condition can be removed.

Uterine Polyps.—Uterine polyps produce menorrhagia and

metrorrhagia, but they are not prone to produce colics. Intrauterine fibroids cause menorrhagia and metrorrhagia, and to a certain extent pains, which might be mistaken for the slighter colics of tubal gestation, but none of these conditions arising from neoplasm are very likely to produce the severer colics of ectopic gestation.

Carcinoma.—Cancer of the uterus is not always productive of pain, but when it produces pain as well as metrorrhagia, the history may be quite like the history of non-tragic stage of ectopic gestation. The physical examination and finding a painful tube or tumor at either side of the uterus, together with inspection of the cervix, eliminate doubtful points in diagnosis.

Ovarian Cyst.—Ovarian cysts with twisted pedicle cause menstruation to be atypical and produce metrorrhagia. The excruciating colics, the steady pain, the soreness of the abdomen, and the metrorrhagia which so often follows the twisting of a pedicle, afford one of the best counterfeits of ectopic gestation. Such cases are, of course, comparatively rare, and are not difficult to diagnosticate, unless the tumor which is twisted on its pedicle was not known to exist prior to the colics and to the atypical menstruation.

Metrorrhagia without abortion may occur for two, three, four, or five weeks in the earlier course of *progressive intrauterine gestation.* The absence of colics, and possibly the presence of morning sickness, the very soft condition of the cervix, a gradually enlarging uterus with no special pain at either side of it, make the diagnosis.

The **treatment** of ectopic gestation is abdominal laparotomy as soon as the diagnosis is made, provided the patient is not in too profound a state of shock from the sudden loss of great amounts of blood. These extreme cases, which constitute a small percentage, are operated on immediately by some, an intravenous saline solution begin given before or during the operation. I agree that such cases should be tided over the state of shock by repeated hypodermoclysis, absolute quiet, elevation of the foot of the bed, and not too energetic cardiac stimulation for a period of twenty-four hours to several days, when the operation is sure to be better borne. During this period the patient should be under the closest observation. After operation, conservative treatment and a long period of sterility are essential to avoid ectopic pregnancy in the other tube, if its condition did not warrant removal at the time of operation.

DISEASES OF THE OVARY

Interstitial Oöphoritis.—Interstitial oöphoritis is of the acute form and of the chronic. The acute inflammation is chiefly caused by a septic or gonorrheal infection and causes a well-marked small-celled infiltration of the interstitial tissue with hyperemia and increase of the vessels. Extravasation of blood into the tissue may result, and if at the same time there is an entrance of pyogenic bacteria, formation of pus takes place. Suppuration involves either the entire tissue, the pus changing the entire ovary into a large abscess cavity (ovarian abscess) by breaking through the walls of the follicle, or else the suppuration is confined to individual parts. In this way there results suppuration of the corpora lutea and the formation of corpus luteum abscesses (Abel).

In the chronic form of interstitial oöphoritis there results the formation of connective tissue with sclerosis; the follicles are destroyed and the stroma shows fibrous connective tissue.

It is not to be doubted that the diseases of childhood may be responsible for chronic alterations in the structure of the ovaries. Infectious diseases like typhoid are likewise a cause of structural alteration. Intraperitoneal conditions, however, are a very frequent cause of isolated ovarian involvement. The peritoneal irritation and peritoneal exudation associated with milder or severer degrees of appendicitis or of tuberculosis result in infection of the follicles and in interstitial inflammation of the ovaries. Upward extension of inflammation from the uterus in the gonorrheal infection of children and in the subacute upward extension of gonorrhea or other inflammation in adults, either through the tubes or through the broad ligaments (paraoöphoritis) is a frequent cause of ovarian involvement with or without the production of adhesions, especially after curettage. In such cases we often have single or multiple Graafian follicle cysts or tubo-ovarian cysts. (See Ovarian Dysmenorrhea.)

Cystic Changes.—Cystic ovarian changes may be due to retention of fluid in the Graafian follicles or corpora lutea, generally

as a result of ovarian inflammation or of infection of the follicles. They may be due to inflammatory changes which involve the tube and ovary, resulting in the formation of a tubo-ovarian cyst. They may be due to proliferating changes occurring in the epithelial components of the ovary as a result of growth of the epithelial elements of the Wolffian body originally present in the formation of every ovary, thus producing cystadenomata. They may be due to the displacement of fetal cells, resulting in the formation of a dermoid cyst. In addition, there are the so-called solid tumors of the ovary.

Retention Cysts.—Retention cysts originate, as a rule, in consequence of chronic inflammatory changes in childhood or later. Through the resulting hyperemia there occurs a serous exudation from the vessels and an effusion of serous fluid into the follicles. In advanced cases the greater portion of the interstitial tissue may be replaced by cysts. The cysts, as a rule, attain the size of a ripe Graafian follicle. The lining of the follicles plays only a passive rôle. Interstitial oöphoritis is the most frequent cause of follicle cysts. The ovary contains numerous follicles of various sizes. Retention cysts, then, are inflammatory cysts and there occurs a "cystic degeneration" of the ovary, often associated with visible diseases of the tubes and with mild adhesions. This condition is generally bilateral. The entire ovary is distended and its surface is irregular. If the condition continues, one follicle may overtop the other, may cause them to atrophy, and result in the formation of a large Graafian follicle cyst.

Graafian Follicle Cysts.—Large Graafian follicle cysts begin either as a single cyst or else one cyst of the inflammatory, cystically degenerated ovary grows excessively, overtops the others, causes their atrophy, so that finally there results a cyst the size of a walnut up to the size of a child's head, consisting of only one chamber with smooth lining, and containing a clear fluid, and with an extremely thin, almost transparent wall and lined by cuboidal cells. Part of the ovary is generally retained at the hilus.

Corpus Luteum Cysts.—Corpus luteum cysts vary in dimension from the size of a large walnut up to the size of an orange, with a thick wall and a yellow or brown irregular lining. Corpus luteum cysts are said to occur under circumstances which we do not

yet understand. The cyst contents come through serous exudation. They are probably due to infection of a ruptured follicle and have the same origin as some of the retention cysts.

Tubo-ovarian Cysts.—Large follicle cysts with a hydrosalpinx form a tubo-ovarian cyst. Tubo-ovarian cysts are therefore inflammatory cysts of the ovary combined with hydrosalpinx. The abdominal end of the tube is attached to and is adherent to the ovary. The ovary is dilated into a large unilocular or multilocular cyst by infection of the follicles. Such tubo-ovarian cysts are situated posterior to the broad ligament and are often fixed far over to the lateral wall of the pelvis, and are exceedingly adherent to the floor of the pelvis and to the sigmoid flexure. They often become so closely attached to the posterior wall of the broad ligament that they seem to be situated within the folds of the broad ligament, and are therefore pseudo-intraligamentous. They are often double-sided, in which case there is a vast difference in their size and development; one side usually being much smaller, less adherent, and much less developed than the other.

Parovarian Cysts.—Parovarian cysts are unilocular cysts with a thin wall containing a clear fluid, situated within the broad ligament and therefore intraligamentous. Upon the external surface is found a long straight tube and a portion of the ovary. They develop from the parovarium, which is situated in the hilus of the ovary in the mesovarium.

Proliferating Ovarian Tumors.—Proliferating ovarian tumors are tumors of active growth developing from epithelial structures situated within the ovary. These tumors have been said to develop from the Graafian follicles or from the surface epithelium of the ovary. However, they probably develop from remnants of the Wolffian body situated in the ovary. They are of two forms:

1. **Glandular Cystoma.**—Cystoma glandulare or cystadenoma pseudo-mucinosum, containing watery, honey-like, or jelly-like contents. Even the watery fluid has a sort of syrupy, sticky consistence. Because the inner lining shows glandular proliferation it is called cystoma glandulare or cystadenoma. Because the contents contain pseudo-mucin, and because the contents are sticky, even if watery, and often of honey-like or jelly-like consistence, the name cystadenoma pseudo-mucinosum is given.

They all contain pseudo-mucin. The wall of the cysts consists of an outer layer of germinal epithelial nature; that is, of the outer structure of the ovary. The middle layer consists of connective tissue;. the inner layer consists of epithelium. Microscopically there are cavities, and tubules lined with epithelial cells of high cylindrical character with nuclei at the base of the epithelium project in microscopic papillary form into the cyst cavity.

These tumors are the most frequent form of ovarian cysts. The tumors are of various sizes, from small cysts to extremely large ones. The entire ovary is involved. Usually there is a main cyst and many smaller cysts, but the outer surface is formed by a common capsule. The surface is smooth if the cyst is composed of one chamber. The surface is irregular if the tumor is composed of several chambers. The form is ovoid or spherical, but sometimes when multilocular it is irregular. The smaller tumors may feel firm and hard, but the larger ones have a cystic feel. These tumors are generally unilateral and pedicled. They may be adherent to omentum and intestine.

Cystadenoma pseudo-mucinosum is the most frequent form and produces the largest tumors. They are generally found between the thirtieth and fiftieth years. Unmarried and sterile women are especially disposed.

Metastases may occur with cystadenoma pseudo-mucinosum. There may occur jelly-like tumors with very thin walls in the peritoneal cavity. If a cystadenoma pseudo-mucinosum ruptures spontaneously or at operation, there may occur such cystic jelly-like tumors in various areas of the peritoneum, which condition is called pseudo-myxoma peritonei.

2. **Papillary Cystoma.**—Cystadenoma serosum or cystoma papillare. They are called cystadenoma because of the epithelial proliferation. They are called cystadenoma serosum because of their thin, clear, fluid contents. Because of the papillary epithelial growths on their inner surface they are also called papillary cystoma. This form is generally multilocular and contains no pseudo-mucin. It is characterized by papillary growths, in that on the cyst lining there are projections formed of epithelium ciliated in character. The entire cyst may be lined with papillary outgrowths of the character of cauliflower. The cyst may be filled with such masses.

The tumors may be of any size, up to that of a man's head. They have an irregular surface. They are often double-sided and not rarely intraligamentous. They often cause ascites. Through energetic epithelial growth, the epithelial masses penetrate the wall and extend up to the peritoneum. These cysts are dangerous because the papillary excrescences have marked tendency to grow through the wall of the cyst. Therefore these tumors are often adherent and the papillary growths produce peritoneal metastases of the same character. When the papillary excrescences perforate the cyst wall, ascites is frequent and the tumor constitutes a malignant form. The early metastases of papillary tumors, however, may disappear after removal of the original tumor.

Dermoid Cysts.—Dermoid cysts are cysts varying in size from that of an egg to that of a child's head. They contain fat, epidermis, hair, bone, teeth, etc., and on microscopic examination contain muscle tissue and various forms of glandular tissue. They often feel hard or solid and are generally adherent.

Teratoma is really a solid dermoid containing the same variety of tissues, with the exception of hair and epidermis. Therefore they are not cystic, but are solid.

The origin of dermoids is to be referred to fetal cells displaced into the ovary by the Wolffian body in the course of embryonal development.

If ectodermal cells are displaced to any extent, so that their presence is manifested by cutis-like tissue, hair, sebaceous glands, etc., we speak of dermoid cysts. If the displaced cells are, so to speak, located in one part of the organ concerned, and if they grow equally, and if the skin cells, as in the normal skin, and the sebaceous glands, excrete their products, a cystic dermoid must result. Since the contents found in dermoid cysts are excreted by the so called "derm" of the cyst, they must lie, when secreted, between the derm and the enveloping tissue composing the organ or tissue in which the dermoids grow. The larger the amount of secretion, the greater is the pressure exerted on the surrounding tissue. If the mass of secreted matter reaches a fair amount, and if it causes a tissue growth in its periphery, and if it distends the enveloping organ or tissue so that it is stretched and flattened, we then have a cystic dermoid whose wall consists of so called "skin," of granulation

tissue, and of the tissue of the enveloping organ. The original group of displaced cells is found then as a prominence only in one part of the so-called cyst, in which are formed the hair, the sebaceous glands, and the other elements found on the inner surface of a dermoid cyst. The greater the amount of substance secreted, and the greater the amount and number of products formed by the displaced ectodermal and mesodermal cells, the larger is the cyst.

If, on the other hand, the displaced cells are not grouped in one part of the organ concerned, and if, at the same time, the ectoderm cells are not present in too great number, there develops a tumor in which the various forms grow into each other. Since the ectoderm cells do not form in such a case a so-called "derm," and since they cannot bring about the formation of a cyst through sebaceous excretion, as above described, a tumor form results which is relatively solid and which seems to be of an entirely different structure—a so-called "teratoma."

The so-called "mixed tumors of the ovary" are the following: enchondroma and osteoma, which are rare; cystic sarcoma, myxofibroma, adenomyxocystoma. In comparison with the mixed tumors of the testicle they are rare. A comparison of the mixed tumors found in the ovary with those in the testicle shows that in the latter there is a prevalence of mesoderm products with a relatively infrequent presence of ectoderm elements. In the ovary, however, these tumors occur more frequently in the forms of dermoid cysts than in the testicle. This may be explained by the fact that in the female the Wolffian duct and the Wolffian body lie at the hilus as non-functionating organs; while in the male they form the vas deferens and functionating tubules.

That enchondromata and osteomata occur frequently in the ovary seems to be overlooked, because these, almost without exception, occur in combination with ectoderm cells, *i. e.*, as dermoid cysts and solid dermoids. This difference is explained, as above, by the fact that the Wolffian body and duct in the female remain as regressive structures and are more liable to growth on their own part and on the part of the cells which they have displaced. On the other hand, the Wolffian duct in the male forms the vas deferens, and a portion of the Wolffian body forms the head of the epididymis and the rete testis, while only a part undergoes

regressive changes, and this part has not, like the Wolffian duct, been in close contact with ectoderm.

In ovarian dermoids and teratomata, ectoderm is present. Therefore teeth are frequently found, and their occurrence is in contrast with their rarity in the testicle.

In dermoid cysts the teeth are embedded in bone, or in the wall of the cyst where no cartilage or bone is to be found; they may also lie in the cyst contents. Their number varies, even one hundred or more having been found in the cyst. The teeth lie, as a rule, on the inner surface of the cyst, and are rarely embedded completely within the wall; another fact which speaks for their origin as explained above, for ectoderm or skin is found on the inner surface. A further interesting fact is that the teeth, in all cases which we have examined, are always unilateral, and, with perhaps one exception among eleven cases which were examined for me by a skilled observer, correspond to that side of the body in which the cysts are found, *i. e.*, in right-sided cysts were found right-sided teeth; in left-sided cysts, teeth of the left side. The occurrence of teeth in dermoid cysts is not limited to the ovary alone, for they are found in dermoid tumors in the brain, the eye, the mediastinum, and in abdominal dermoids. The teeth may be either first or second teeth, and both forms may be found in the same tumor. They may be molars, bicuspids, incisors, etc., and may represent the teeth of the upper or lower jaws.

The dermoid cysts of the ovary do not always take their origin from the ovary. If, however, they do, the ovary may be entirely dilated by the tumor which has developed in it. On the other hand, the ovary may be found only in one part of the cyst wall in cases where the dermoid cyst originated at the hilus and grew into the broad ligament. Dermoid cysts may develop in the broad ligament and the ovary takes no part in the formation of the tumor, but lies absolutely free, showing, however, as a rule various changes.

The cells from which dermoid cysts develop may be carried into various parts of the ovary, so that several dermoids are present. Olshausen found in one case a proliferating cystoma of the ovary with a dermoid cyst of the size of an egg. In another case he found three dermoid cysts side by side. Wilms reported a case where five small dermoid cysts were present in one ovary.

Dermoid cysts of the ovary frequently contain, in addition to epidermis and hair, smooth muscle fibers, cartilage, bone, teeth, connective tissue, neuroglia cells, structures like spinal ganglia, and cysts. The latter may be lined with simple or stratified cylindric epithelium or with ciliated epithelium. The inner surface of the cysts may show papillary excrescences, or may be lined with crypts containing beaker cells. In other words, we find microscopically in these dermoid cysts the same glandular structures as are found in the various adenomata, cystomata, and cystadenomata of the ovary whose origin we have referred to the Wolffian body tubules.

Among other interesting structures found in dermoid cysts must be mentioned nails (finger-nails), of which very fine specimens are to be found in the museum of the Anatomical Institute of Vienna. Olshausen says: "It should not be considered strange if nails belonging to the skin are frequently found in dermoid cysts. The collection in the Gynecological Clinic in Halle contains a specimen of a dermoid cyst of a goose containing a large number of feathers."

Dermoid cysts are frequently combined with proliferating cystomata. As a rule, a cystoma is found in the same ovary in addition to a dermoid cyst, but more frequently there are found in the walls of the dermoid cyst smaller or larger formations of the same character as in simple proliferating cystoma. These two forms are to be distinguished from these combinations of two separate tumors, the one a dermoid, the other a cystoma, united through adhesion and perforation of the separating walls. The occurrence of a dermoid in one ovary with a cystoma in the other is by no means rare. Olshausen quotes a case of Flaischen in which a proliferation of the connective tissue was present in the same ovary; the walls of the cyst showed sarcomatous degeneration. A case of Unverricht showed, in the left ovary, the characteristic elements of a dermoid, and also red, spongy masses which were included as distinct nodules in the connective-tissue capsule. The case presented a round-celled sarcoma. Tumors of the same form were found in the cervix, peritoneum, omentum, liver, and diaphragm. Although the tumors in these latter situations are to be considered metastases, that in the cervix probably originated from the Wolffian

duct, in the same way as the main tumor in the ovary. That dermoids and teratoma should form metastases and undergo malignant degeneration into carcinomata, etc., is very natural, for they are nothing else but the cells of the patient, and may, therefore, pass through the same changes as the normally situated cells of the body.

Solid Tumors.—The solid tumors of the ovary are fibroma, sarcoma, true carcinoma, papilloma, endothelioma, and teratoma. With myoma or malignant tumors of the uterus the ovaries are hyperemic and edematous. In ovarian fibroma the ovarian tissue is replaced by fibrous connective tissue. The external form of the ovary is usually preserved. Such changes are most often observed with uterine myomata. Myomata of the ovary are rare, and when they occur are usually mixed tumors. They are usually round-celled and of soft consistence. Papillomata are solid tumors of the form which also occurs when the cyst wall is perforated by the papillary growths in the cyst with papillary cystomata. Carcinoma of the ovary has an irregular surface, early ascites, many adhesions, and peritoneal metastases. No sharp clinical distinction is made by most surgeons between pure carcinoma and solid papilloma.

DIAGNOSIS

In *chronic oöphoritis* the ovary is rarely larger than a hen's egg. It is sensitive and other inflammatory evidences may be present. In making the diagnosis of chronic oöphoritis, the ovary must be felt to be structurally altered and to be painful and sensitive on pressure. Care must be taken not to include in this class an ovary containing a Graafian follicle about to burst, which gives on the first bimanual examination evidences of an enlarged sensitive ovary. Repeated examinations must show an ovary to be constantly altered. Small cystic degeneration is evidenced by a hard, tense feel and an irregular surface. In the smaller cystic conditions of the ovary the cystic consistence is generally lacking. Such an ovary is found only on careful bimanual examination. It may be situated in the normal location of the ovary, but very often it is posterior to the uterus or situated in the cul-de-sac of Douglas. These smaller conditions are of various sizes and are with or without adhesions.

This change in the ovary is often the cause of ovarian dysmenorrhea, of intermenstrual ovarian pain, pain felt in the hips, the thighs, the back or under the ribs. (See pages 232, 323.)

An *intraligamentous cyst* is situated in the broad ligament close to the uterus, extending up to the pelvic wall. When large it bulges down into one lateral fornix. It has a rounded upper surface and has little mobility. The uterus is often pushed away from the median line. A pseudo-intraligamentous cyst is a retroligamentous tumor fixed to the floor of the pelvis and to the broad ligament, which is situated on its anterior and upper surface. The anterior surface of the cyst is often so closely attached to the broad ligament as to make the tumor seem intraligamentous.

Intraligamentous cysts are of limited mobility. They cannot be pulled or pushed out of the pelvis. They are situated close to the uterus. The folds of Douglas are situated median to them and posterior to them; while in retrouterine tumors the fold of Douglas is anterior to the tumor. With intraligamentous tumors the connection of the cyst with the uterus is thinner than the beefy connection of an intraligamentous myoma. Intraligamentous cysts must be diagnosed also from pseudo-intraligamentous tubo-ovarian tumors, from intraligamentous hematoma, etc.

Ovarian tumors must especially be diagnosed from pedicled myomata. Ovarian cysts have a cystic feel, but are often hard; especially is this the case with dermoid cysts of the ovary. In order to make out the pedicle, the tumor should be pushed up into the abdominal cavity and the uterus pulled down by volsella. As a rule, ovarian tumors have a thin membranous pedicle, while fibromata have a thicker, rounder, and more meaty pedicle. If with a cystic tumor two normal ovaries can be palpated, the diagnosis of pedicled fibromyoma is made.

With *ovarian cysts of large size* a differential diagnosis must be made from encapsulated ascites due to tuberculosis, from the ascites of carcinoma, and from peritoneal exudate. The main point is to feel a pedicled connection with the uterus. The uterus should be pulled down by tenaculum forceps to make the pedicle tense and an assistant should pull the tumor upward. Then with one or two fingers introduced into the rectum the external fingers should meet the fingers situated in the rectum between the uterine horn and

the tumor. In this way the pedunculated character of the tumor and the character of the pedicle can be made out. The horn of the uterus on the side from which the tumor comes is less movable than the other one. Diagnosis is aided by percussion, by palpation, and by inspection of the abdomen. In encapsulated ascites there is not such a round contour and nodules may be felt. A tympanitic resonance may be obtained as a result of the adherent intestine situated over the encapsulated fluid, and there is a less clearly outlined tumor than is the case with ovarian cyst. A distended bladder may be excluded by the use of the catheter. Echinococcus cyst usually shows an associated involvement of the liver. Pregnancy of the fourth or fifth month, especially if the uterus is anteflexed, demands a differential diagnosis from ovarian cyst. The portio seems separated from the fundus by the area of Hegar and the portio may be mistaken for the uterus. By examination through the vagina and through the rectum there must be proved a continuation of the portio into the pregnant fundus. If the fundus of such a pregnant uterus is situated laterally, it resembles an intraligamentous cyst. The history of amenorrhea, morning nausea, the evidences of ballottement, and bluish discoloration of the vagina are points of importance. Often these cases must be watched for weeks until fetal movements and the beating of the fetal heart in the second half of pregnancy make the diagnosis of pregnancy absolute. The only doubt at this period is produced by those cases of pregnancy with dead fetus. Under such circumstances the sound may be used.

In the *very large tumors* of the ovary a differential diagnosis must be made from obesity and meteorismus. A real diagnosis between free ascites and ovarian tumor is often made only at operation. It is essential to prove the pedicled connection with the uterus. In free ascites the abdomen is more flat, the lateral borders of the abdomen are prominent, and the center of the abdomen is more flat. Cysts produce a projection in the middle of the abdomen, while the lateral borders are flatter. In ascites the percussion note in the lower part of the abdomen is dull, while it is tympanitic above. With increase of the ascites the horizontal line of delimitation between the dull area below and the tympanitic area above extends upward above the umbilicus until finally the

tympanitic note is entirely lost, if so much fluid is accumulated that the interstitial mesentery is too short to permit the intestines to come near the abdominal wall. Ovarian tumors produce a dull note in the center and a tympanitic note laterally. An important diagnostic point is found in the fact that even if ascites gives a dull note on percussion, yet percussion with the fingers pressed deeply into the abdomen will give a touch of tympanitic resonance. In ascites if the hands are placed on the lateral borders of the abdomen and tapped gently, a wave of fluctuation toward the other side is produced. Alterations in tympanitic resonance are produced by changes of position. If tapping is done, ascitic fluid has a specific gravity of 1010 to 1015.

A very difficult diagnosis is that of *ascites associated with ovarian tumors*. When the ascites is due to papilloma, no diagnosis can be made without puncture and draining of the abdomen, after which the papillomata may be felt and disseminated nodules may be made out throughout the entire abdominal cavity.

Twist of the pedicle in the case of ovarian cyst produces pain and increases the size of the tumor as the result of hemorrhage. There is a local peritonitis, which with gangrene of the cyst may become a general peritonitis. Adhesion to the intestine and omentum occurs early.

Malignant ovarian tumors have hard irregular surfaces, are often double-sided, and produce ascites. Ascites is not always a sign of malignancy, for it may occur with glandular cystoma, with fibroma ovarii and fibrosarcoma of the ovary, and with papilloma. With malignant ovarian tumors there is cachexia, the tumor is firmly fixed to the surrounding structures, and hard disseminated nodules can be felt in the upper abdomen.

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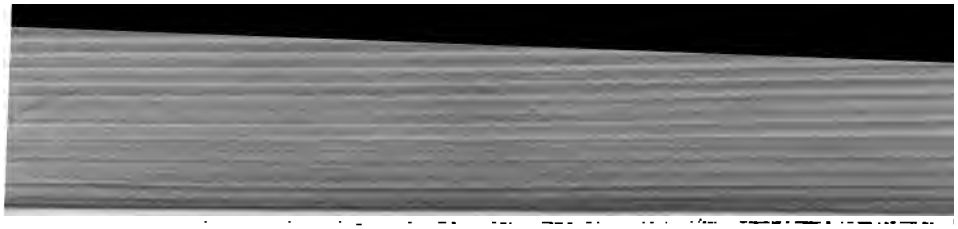

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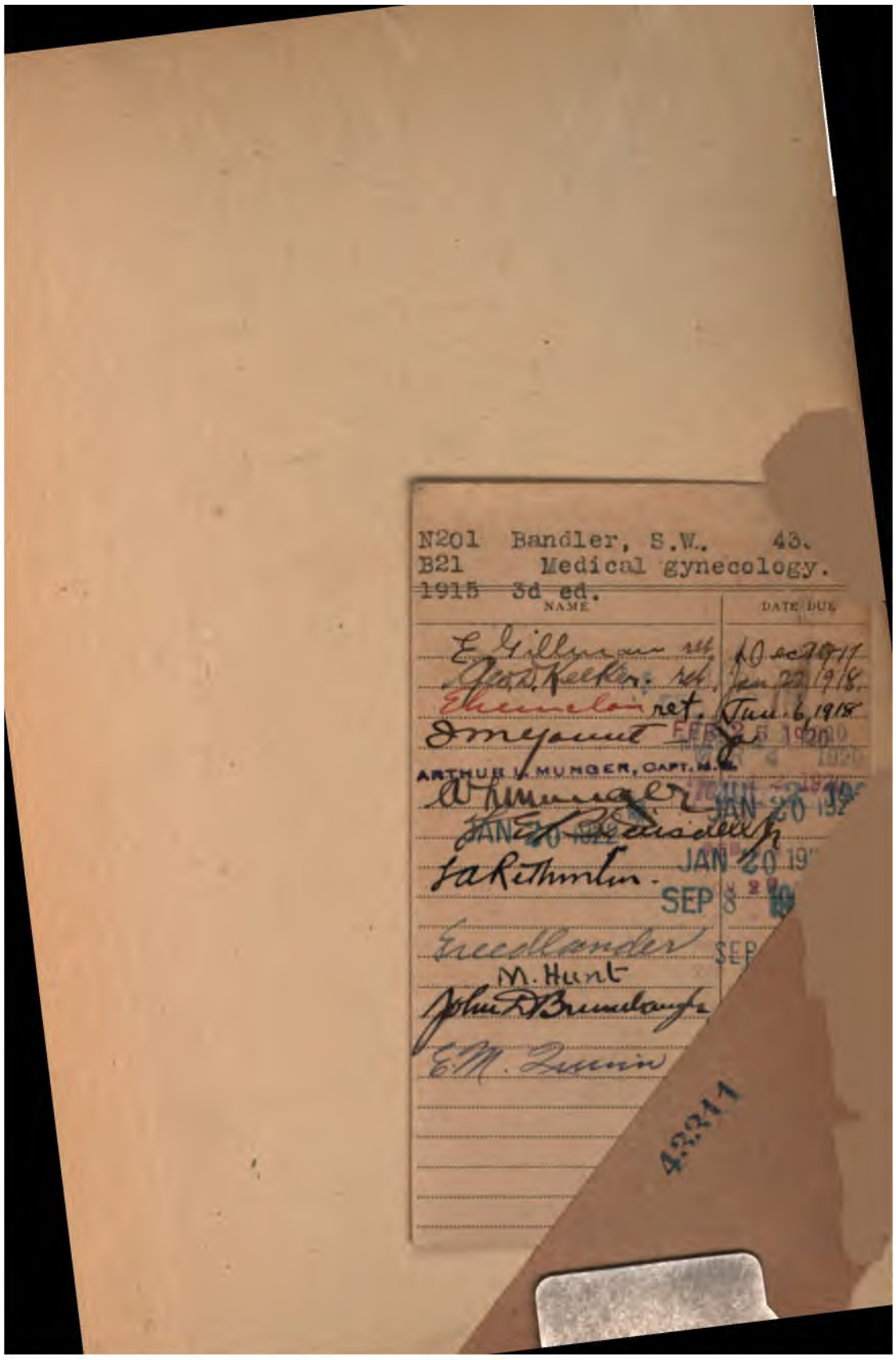

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